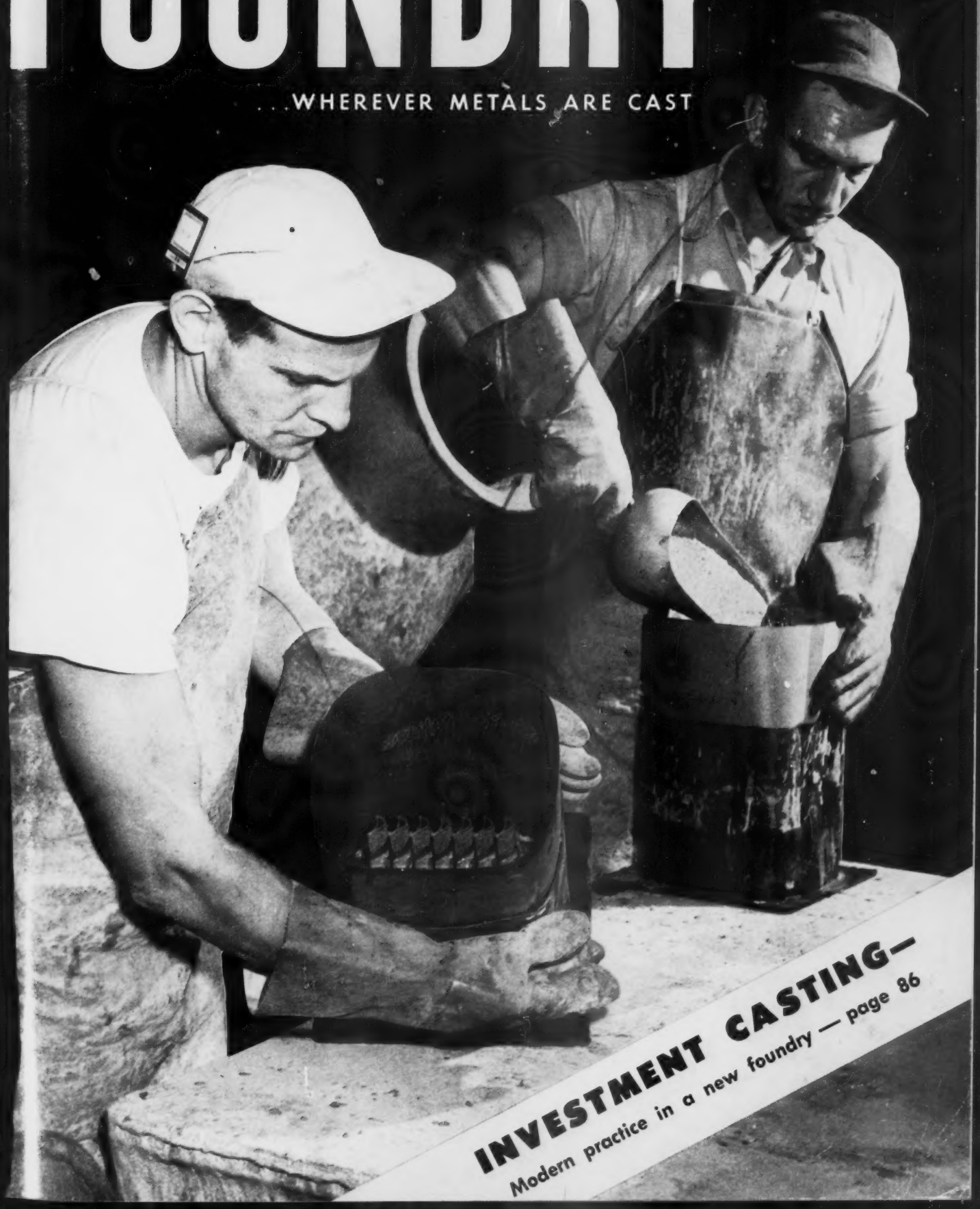
JANUARY 1953

FOUNDRY

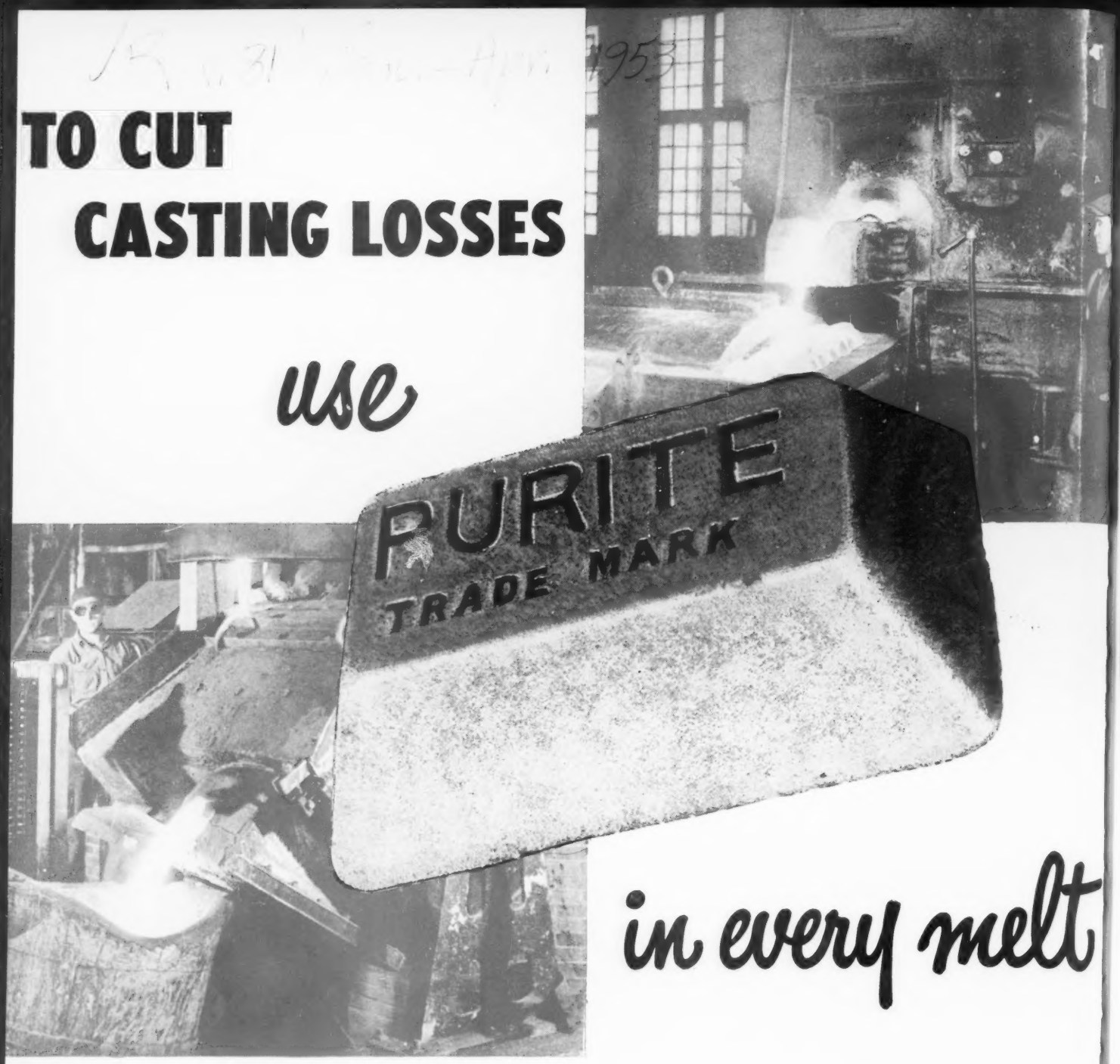
...WHEREVER METALS ARE CAST



INVESTMENT CASTING—
Modern practice in a new foundry — page 86

TO CUT CASTING LOSSES

use



in every melt

Every day, more leading foundries are using Purite *regularly* to cut casting losses and increase production of finished work. In these foundries, the use of Purite is standard operational procedure in every cupola charge. In the ladle too, Purite helps keep production high.

For over 30 years, Purite has been the choice of leading foundries everywhere. Here's why:

1. **Purite produces a higher percentage of finished castings per ton of metal poured.**
2. **Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.**
3. **Purite gets to all the iron quicker.**
4. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
5. **Purite comes in 2-lb. pigs—no weighing or measuring required.**
6. **Purite is 100% pure fused soda ash—you do not pay for inert materials.**
7. **Purite does not crumble—no waste—no dust.**
8. **Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.**

Purite, the scientific flux for better melting and cleaner iron, is sold by all leading foundry supply houses in the United States and Canada. Mathieson Chemical Corporation, Baltimore 3, Maryland.

Mathieson
CHEMICALS

TECHNOLOGY DEPT.

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DETROIT

60% longer service life from Nickel iron pots

In addition to producing 80 sizes of melting pots, C. H. MILLES FOUNDRY COMPANY devotes a large portion of its production to metal ingot molds.

A service life of 100 days is good for a plain cast iron melting pot.

But C. H. MILLES FOUNDRY COMPANY of Chicago, Ill., wanted to provide even longer life in the pots they cast.

So they experimented and found that cast iron containing 1.00 to 1.25% nickel would give longer life.

In fact, a typical comparison gave a life span of 160 days for the nickel iron to 100 days for plain iron—an increase of 60%!

Melting pots and ingot molds such as are shown here are typical of the nickel cast iron parts used in elevated temperature applications. At temperatures up to 1300°F. nickel alloyed cast irons maintain a higher proportion of their room temperature strength and hardness, and show less growth and scaling, than unalloyed irons. For applications involving temperatures as high as 1500°F. the austenitic Ni-Resist® compositions are recommended.

At the present time, nickel is available for the production of nickel cast irons and other alloys containing nickel, for end uses in defense and defense supporting industries. The remainder of the supply is available for some civilian applications and governmental stockpiling.

EMBLEM OF INCO SERVICE

The International Nickel Company, Inc.
Dept. 20, 67 Wall Street, New York 5, N. Y.

Please send me booklet entitled, "Guide to the Selection of Engineering Cast Irons."

Name _____ Title _____

Company _____

Address _____

City _____ State _____

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

WHY MOST FOUNDRIES USE SEACOAL, BENTONITE AND SAND STABILIZER FOR THE PREPARATION OF FACING SAND

Here are the reasons why an overwhelming majority of iron foundries, for many years, have found that molding sands prepared with seacoal, bentonite and sand stabilizer definitely can be relied upon for uniform, advantageous and thoroughly satisfactory results . . .

EASY TO USE—Because they are finely ground, dry materials, seacoal, bentonite and sand stabilizer are easy to handle, easy to add and mix with sand. Seacoal and bentonite are ground and screened in a variety of grades to suit the requirements of every type of work.

EASY SAND CONTROL—It's easy to control all of the important physical characteristics of molding sand with seacoal, bentonite and sand stabilizer. By adding the proper amount of seacoal, the carbon content can be controlled at will and changed to suit the job. Through the use of bentonite, the green and dry strength of the sand can be varied as required. The ad-mix of sand stabilizer provides control of flowability, so molds can be rammed to proper hardness. At the same time, it reduces the possibility of "buckles", "blows", "scabs", "swells", "cuts", etc., by fortifying the sand to insure proper expansion and contraction. The safe moisture range of the prepared sand is also broadened. Depending on the job to be made, moistures can safely be run higher, because sand stabilizer attracts considerable moisture to itself.

LOW COST SAND—It's not necessary to use a special grade sand or a fine mesh sand for this method of sand preparation. Any grain size may be used, so permeability is easy to control. And common lake sand may be added to the mixture as replacement.

BETTER CASTINGS—This type of sand preparation insures the production of good castings. Better casting finish is definitely obtained—pattern-true, free of surface imperfections and free of distortion.

BETTER SHAKEOUT—Cleaner, better and less-lumpy shakeouts are obtained with sand thus prepared. Sand adherence is greatly reduced, thereby minimizing the necessity for sand replacement to the heap or system.

LOWER COSTS—Seacoal is extremely low in cost. A prominent automotive production foundry determined that seacoal actually costs them only 25c per ton of castings produced. Bentonite and sand stabilizer, too, are inexpensive additives. Furthermore, low cost sand of proper grain size may be used for replacement, to keep costs to a minimum.

CROWN HILL SEACOAL ANALYSIS	
Proximate	
(Moisture Free)	
Volatile Matter	38.9%
Fixed Carbon	57.4%
Ash	3.7%
Ultimate	
Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
Fusion Point	2780° F

CROWN HILL Seacoal, mined by FEDERAL at Crown Hill, West Virginia, is *high* in volatile combustible matter and *low* in sulphur and ash content—basic requirements for a top quality seacoal. Check the analysis of Crown Hill Seacoal shown at the left, prepared by the U. S. Bureau of Mines.

GREEN BOND Bentonite, produced and guaranteed by FEDERAL, is unexcelled in uniformity and ability to develop and control green and dry strength. It produces high green and dry strength in sharp sands even when comprising but ½% to ¾% of the entire mixture. Truly the best of the bentonites!

FEDERAL Sand Stabilizer is a processed cellulose sand additive, greatly superior to wood flour, cereal binders, iron oxides, etc. Its high combustibility allows sand to expand evenly to eliminate casting defects. It increases sand flowability, providing much better ramming conditions. And it attracts moisture to itself, to broaden the safe moisture range.

AND HERE'S WHY THEY PREFER CROWN HILL Seacoal, GREEN BOND Bentonite and FEDERAL Sand Stabilizer . . .

* * *

To learn how your foundry, too, can be assured of tailor-made sand for every job, plus easy control of the important physical characteristics of sand, at low cost—write us for informative bulletin on the use of Crown Hill Seacoal, Green Bond Bentonite and Federal Sand Stabilizer.

FEDERAL

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

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TECHNOLOGY DEPT.

JANUARY 1953

FOUNDRY

Volume 81—Number 1

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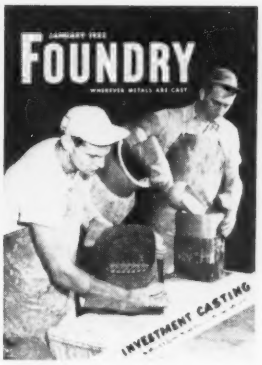

THE COVER: Adding investment material to flasks at new foundry of Michigan Steel Casting Co. (p. 86)

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DEPARTMENTS

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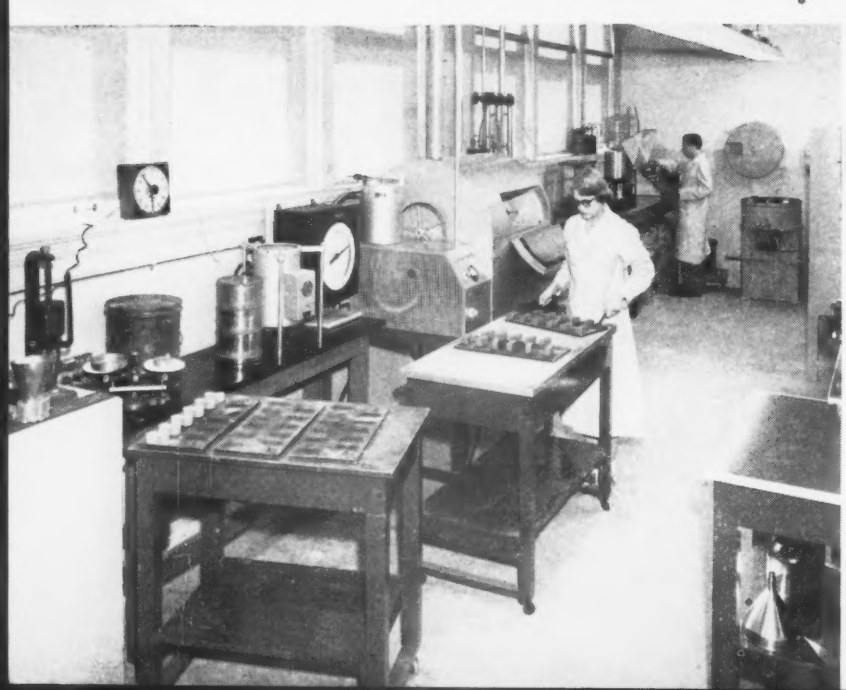
LINOIL

CORE OILS

PRODUCE

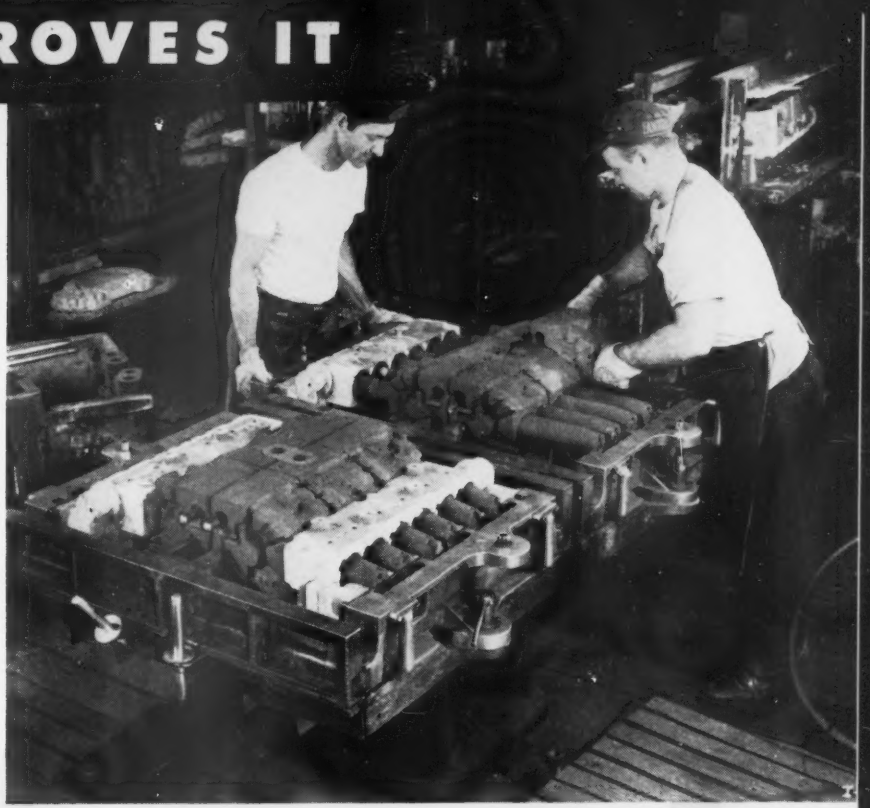
Better Cores at Lower Cost

WE PROVE IT



Linoil Research continually examines and evaluates new materials for use in improving core binders. When a material looks promising, it is sent to ARCHER-DANIELS-MIDLAND Sand Laboratories for a thorough observation in all core properties, permeability, flowability, green and baked strength, collapsibility, and many others. Once the new grade of LINOIL has been developed, manufacturing control laboratories in each of the three LINOIL plants make certain that chemical and physical specifications are never varied. No matter what grade of LINOIL you specify, you are assured consistent performance from the best core oil you can buy.

STUDEBAKER PROVES IT



Many automotive foundrymen consider the core room to be the most important department in the foundry. Cores aren't responsible for all the problems of the molding and cleaning departments; but a smoothly operating core room does mean far fewer headaches in the rest of the shop.

Like most automotive foundries, Studebaker uses LINOIL. They find that LINOIL gives them good, useable cores at a low cost. And they know that once careful controls are established on any core job, LINOIL can be depended upon to give uniform results.

YOU CAN PROVE IT

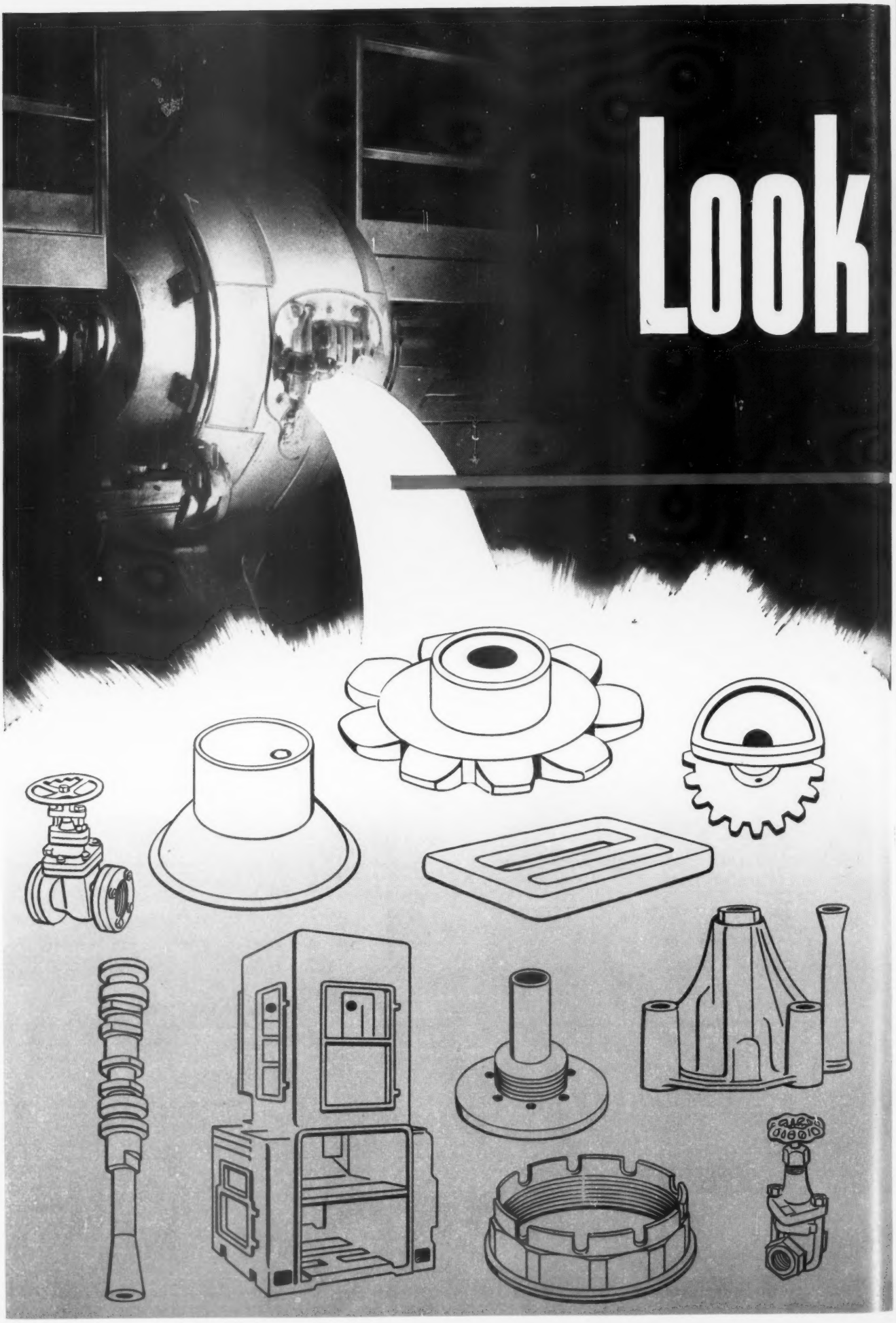
Ask your LINOIL representative to give a demonstration with your core work right in your own foundry. He'll select the grade of LINOIL that's best for your condition, then show you how your cores can be made to do a better job at a lower cost, with LINOIL core oils. And if you've got a particular core problem that's hard to solve, he'll be glad to help you work it out.

Have you heard about the New LINOIL 700 Core Oils?

Here are the facts: No matter what core oil you are now using, you can replace it with one of the newly-developed LINOIL 700 Series and get greater tensile strengths *at a lower cost.* The LINOIL 700 core oils are easy to work with, too. They're proving to be the best core oil buy in the history of the foundry industry. Ask your LINOIL man about the "700 Series"—or write for further information.

ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th STREET • CLEVELAND 2, OHIO


Look

what comes out...

of Detroit ROCKING Electric Furnaces

These versatile furnaces provide uniform heats for an amazing variety of quality products

The day's work of Detroit Rocking Electric Furnaces in the nation's foundries ends up as valves, automotive castings, bases and component parts for machines, gears, rings, splines, bearings, bushings, electrical contacts. Shapes range from simplest to most complex. Metals, too, range the list—steel, bronze, brass, iron and their alloys.

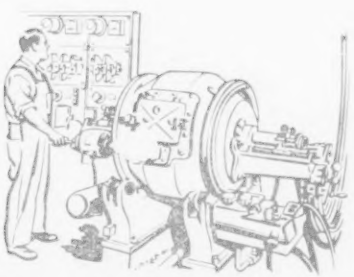
Wherever they are used, Detroit Rocking Electric Furnaces produce uniform, high-quality metal. When the pattern of operation is set, metal composition and melting cycle is duplicated in production heat after heat and day after day.

Rocking action of these furnaces delivers real advantages. The controlled motion means homogeneity of the metal. As the molten metal washes back and forth, it picks up heat from the refractory, increasing furnace efficiency and refractory life.

As for economy, here are some of Detroit Rocking Electric Furnace benefits: (1) optimum use of power; (2) reduced metal shrinkage; (3) more *usable* metal per melt; (4) fewer rejected castings; (5) more heats per day; (6) less out-of-production time since shells are easily replaced; (7) longer lining life; (8) longer furnace life.

Detroit Rocking Electric Furnaces may well be the best solution to your melting problems, too. Our engineers will work with you to give you facts on high efficiency, operating economy, and quality control, fitted to your production requirements. Write today!

Faster heats, better metal



ROCKING ACTION DOES IT!

DETROIT ELECTRIC FURNACE DIVISION

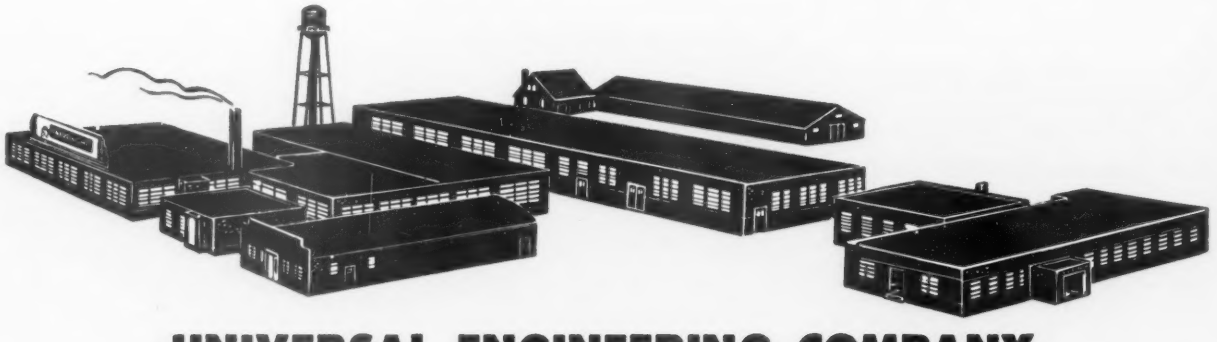
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N.Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

UNIVERSAL flask pins and bushings are typical of the quality products that have helped to build Universal's Frankenmuth plant

Universal Flask Pins and Bushings are heat-treated and precision ground from finest quality steels. They will save you precious minutes of production time by assuring instant, accurate alignment of cope and drag. Universal Flask Pins and Bushings will give you long, satisfactory service and they will stand up under extremely rough treatment, thus saving you the additional cost and down-time that replacement always requires. Universal Flask Pins and Bushings are typical of the quality products being produced at the big, modern plant of the Universal Engineering Company in Frankenmuth, Michigan.

The modern home of finer production tools

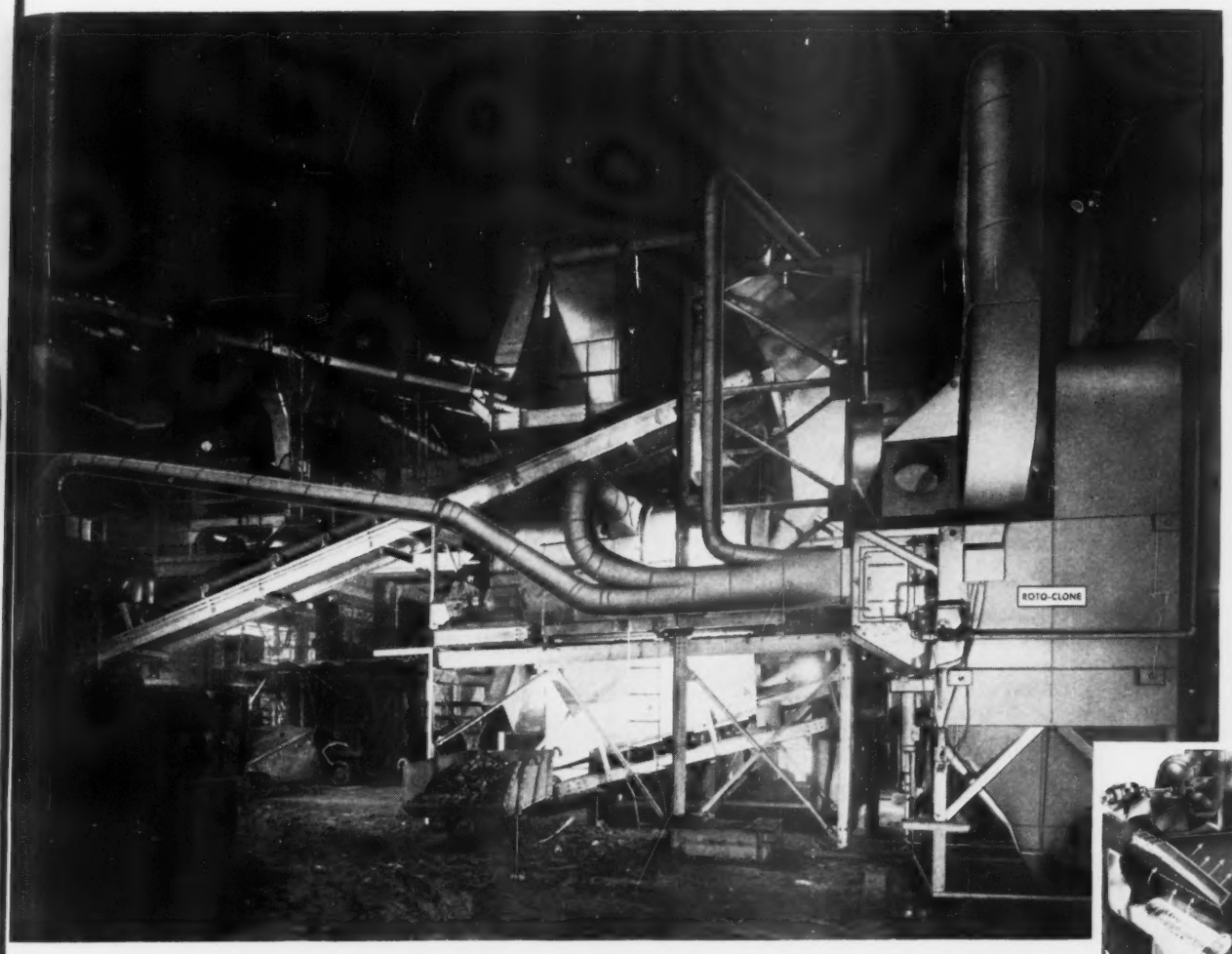


UNIVERSAL ENGINEERING COMPANY

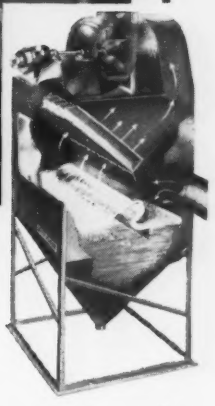
FRANKENMUTH 4, MICHIGAN

158

today's best buy is better air!



Type N Roto-Clone Arrangement D Sand Conditioning Installation.



Roto-Clone Type N Cut-away

A MAN-HOUR SUPPLY worth thinking about!

AAF Roto-Clones Improve Working Conditions By Eliminating Dust and Fumes.

Human efficiency and willingness to work are intangible factors that have a decidedly "tangible" effect on production schedules. Modern foundries find that improved working conditions, through the elimination of dust and noxious fumes by AAF Roto-Clones*, measurably increase efficiency as well as reduce absenteeism and labor turnover.

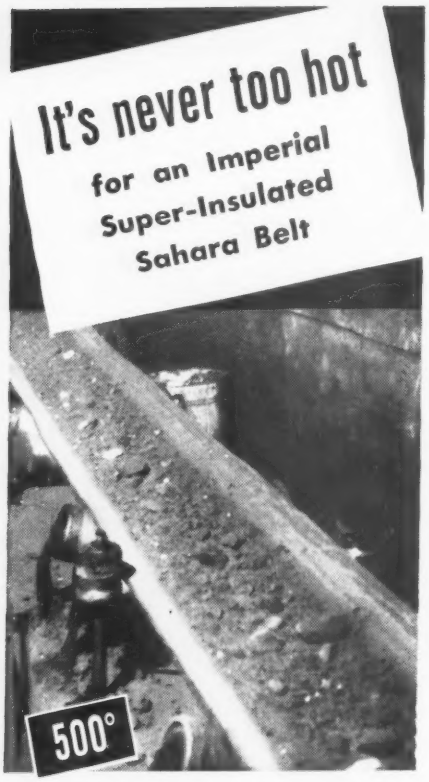
One-third of the foundry's dust occurs in sand conditioning systems like the one above. The Type N Roto-Clone shown is a hydro-static precipitator of high efficiency which removes dust by dual washing and scrubbing action and combines in one unit all three functions of exhausting, separating, and storing dust . . . in the form of sludge.

The complete line of AAF Roto-Clones offers a wide selection of performance and operating characteristics that will efficiently control every dust source. For the correct solution to your dust or air pollution problems call your nearby AAF representative or write direct to American Air Filter Company.

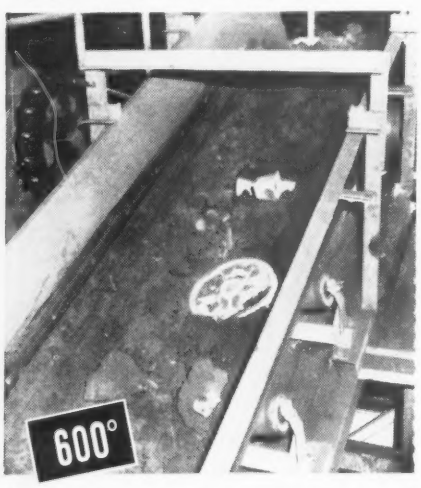
**ROTO-CLONE is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Ky. • American Air Filter of Canada, Ltd., Montreal, P. Q.



At American Chain & Cable Co., this belt ran 24 hours a day, 5 days a week for over 2 years—handling hot shakeout sand with temperatures up to 500°. During this time production was accelerated and equipment operated at top speed.



$750 per hour shutdowns were eliminated by a farm implement company when they installed this belt to convey white-hot castings and knockout sand. Result: $30,000 saving in 12 months.

• • • • • •

Write for data sheet 47-8 and case histories on belts for handling hot materials.

Imperial
BELTING CO.
1755 S. KILBOURN AVE., CHICAGO 23, ILL.
Engineered Belting—
The Right Belt for Each Job

With the EDITORS

SPECIAL FOR MARCH: For weeks past the editors have been having a regular field day at the new Cleveland Foundry of the Ford Motor Co. Bill Gude, Ed Bremer, Bob Herrmann and I have spent hours tramping that huge plant, viewing operations from catwalks and other points of vantage, studying the tremendous amount of the most modern equipment from every angle, and doing our best to see just how it ticks. Then we have talked with many on the management team, and have pored over blueprints which show the layout of every nook and cranny in this huge foundry. From all of this activity we have prepared a series of technical articles on Ford foundry. And because this is one of the most modern foundries in the world, and the focal point of interest on the part of foundrymen everywhere, we are presenting the complete story of the Cleveland Ford Foundry as the special feature in the March issue. This is the first time in its 60 years of service to the industry that FOUNDRY has undertaken such a large job of technical reporting in a single issue.

—o—

Cover: The photograph reproduced on the cover of this issue shows the preparation of the investment in production of precision investment castings at the new plant of the Whitehall Precision Casting Division, Michigan Steel Casting Co., Whitehall, Mich. The thoroughly mixed investment is placed around the dip coated wax patterns (shown in the flask at the left) while the flask rests on a magnetic vibrator. The operation requires much skill and special care, as is described in the article by Ted Operhall starting on page 86 of this issue. The cover photograph and those used in the article were prepared by Bervin Johnson of Whitehall.

—o—

Old Lumberman: Friends of Jack Lathrop, retired advertising manager of FOUNDRY, and self styled "old lumberman" of Torch Lake in upper Michigan, will be interested in the following paragraph in a recent letter:

"Winter has come to the North country. We have quite a bit of snow and I have done a lot of plowing with my new tractor. It sure handles it in fine shape and it would be impossible for me to clear the place by hand shoveling. Got a set of tire chains for it, and that plus the regular tractor treads sure do the trick. Today I have been buzzing stove wood for the kitchen range and I am getting ready for some splitting and buck sawing if the weather permits for a few days more. Sixteen degrees last night, cloudless and a full moon. Boy, that alone is a sight up here. I imagine you do not know whether there is a moon any more but I assure you it is still up there and working."

—o—

Another Anniversary: Archer-Daniels-Midland Co., whose Foundry Products Division advertisement appears on pages 4 and 5 of this issue, recently celebrated the 50th anniversary of the founding of the company, as a small linseed oil mill, at Minneapolis. The photograph

shows Samuel Mairs, chairman of the board of ADM, passing a piece of the anniversary cake to T. L. Daniels, president and son of the founder of the company.

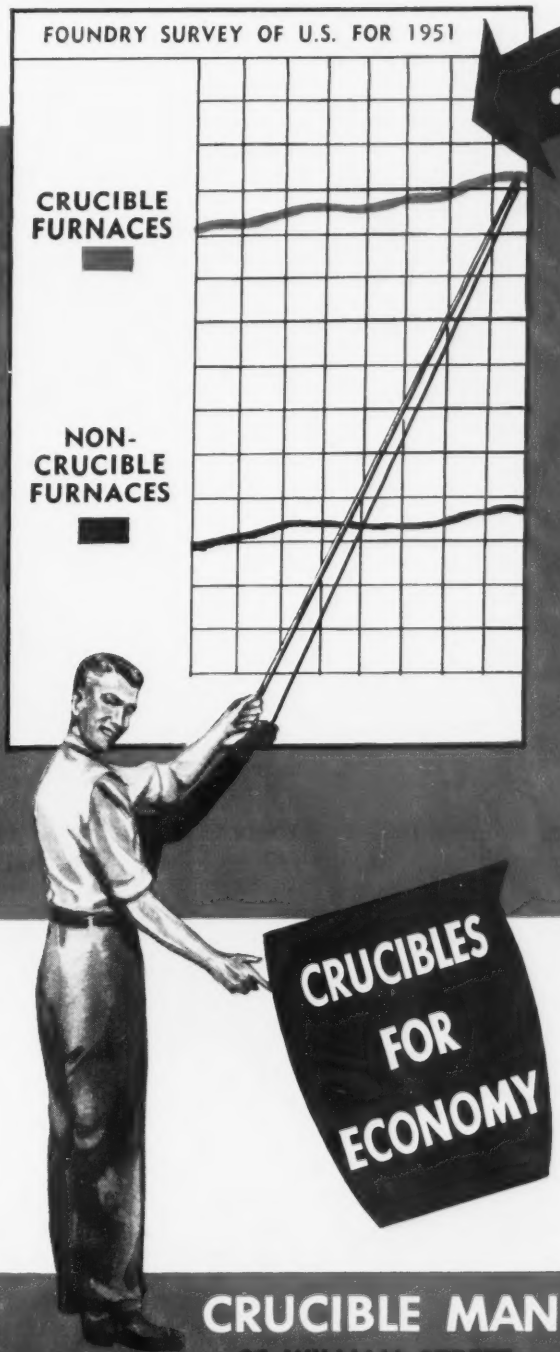
—o—

Visits the Hindles: Erle Ross, Chicago editor, and Mrs. Ross spent their vacation on an extensive automobile trip through the Pacific Northwest. On the way out they spent a few hours with Prof. Norman F. Hindle, head of the Department of Mechanical Engineering at the University of Idaho, Moscow, Idaho. Before going to the university in 1947, Norm was director of the Technical Development Program, American Foundrymen's Society, for many years, and prior to that served several years as assistant editor of FOUNDRY. Erle Ross reports that Norm and Jean Hindle had just returned from a camping trip to Canada, and that they looked fine. Norm

(*Concluded on page* 12)

CRUCIBLE MELTING

... LEADS three to one



A foundry survey* of the United States for 1951 gives capacity of all Crucible furnaces at 4,703,037 lbs. of non-ferrous metals: all non-Crucible furnaces, capacity 1,406,165 lbs.

According to the same survey, the total capacity per charge of all Crucible furnaces is steadily increasing; thus, in 1950 the figure was 4,322,008 lbs., an increase for 1951 of 381,000 lbs. or 8.8%.

Foundrymen know their melting methods. Such persistent popularity and preference result from a combination of advantages obtainable only with Crucible melting.

*The Foundry Industry Data Book—The Foundry

CRUCIBLE MELTERS' HANDBOOK SENT FREE; GIVES INFORMATION ON THE CARE AND USE OF CRUCIBLES.

CRUCIBLE MANUFACTURERS ASSOCIATION

27 WILLIAM STREET NEW YORK 5, N. Y.

THESE FIRMS CAN TAKE CARE OF ALL YOUR REQUIREMENTS FOR CRUCIBLE MELTING

AMERICAN REFRACTORIES & CRUCIBLE CORP.

ELECTRO REFRACTORIES & ABRASIVES CORP.

JOSEPH DIXON CRUCIBLE CO.

ROSS-TACONY CRUCIBLE CO.

LAVA CRUCIBLE-REFRACTORIES CO.

VESUVIUS CRUCIBLE CO.

A two-finger tapper . . . but he knows his wheel types!

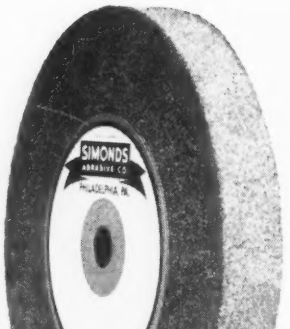
SIMONDS ABRASIVE CO.

Grinding Wheels

No need to fumble for the right type of grinding wheel.

Simonds Abrasive Company's complete line has everything from giant wheels for production grinding to abrasive grain for polishing . . . everything you need for finishing, shaping, cutting-off, smoothing or sharpening.

You'll find our free data book mighty helpful. It gives wheel recommendations, lists specifications and suggests methods for safe, productive grinding. We'll gladly send it, together with name of your Simonds distributor. He can save you time, trouble and money. Write.



SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(*Concluded from page* 10)

keeps up his interest in the foundry industry, and is embarking on a program of expanding and modernizing the foundry program and improving instruction in that subject. Norm sends his best regards to old friends in the foundry industry, and hopes anyone traveling in the vicinity of Moscow will call at the University.

—o—

Castings While You Wait: Speaking of vacation, we recently ran across the following news report which may be of interest to those traveling through the Smoky Mountains of Tennessee:

"Pigeon Forge Foundry, a new aluminum casting plant scheduled to start operations at Pigeon Forge next spring, will specialize in the manufacture of items for sale to the tourist trade. A new two-story block building, 30 x 60 ft, is being erected to house the foundry operations; it will include a show room with large plate glass windows for spectator-viewing of the electric melting furnaces and casting operation, says the *Gatlinburg Press*. The five partners starting the business are Ned Williams, Myron Boyd, Robert Williams and George Lyngel, all of Toledo, O., and G. R. Nerber of Albion, Mich. All are experienced in patternmaking and aluminum foundry work."

—o—

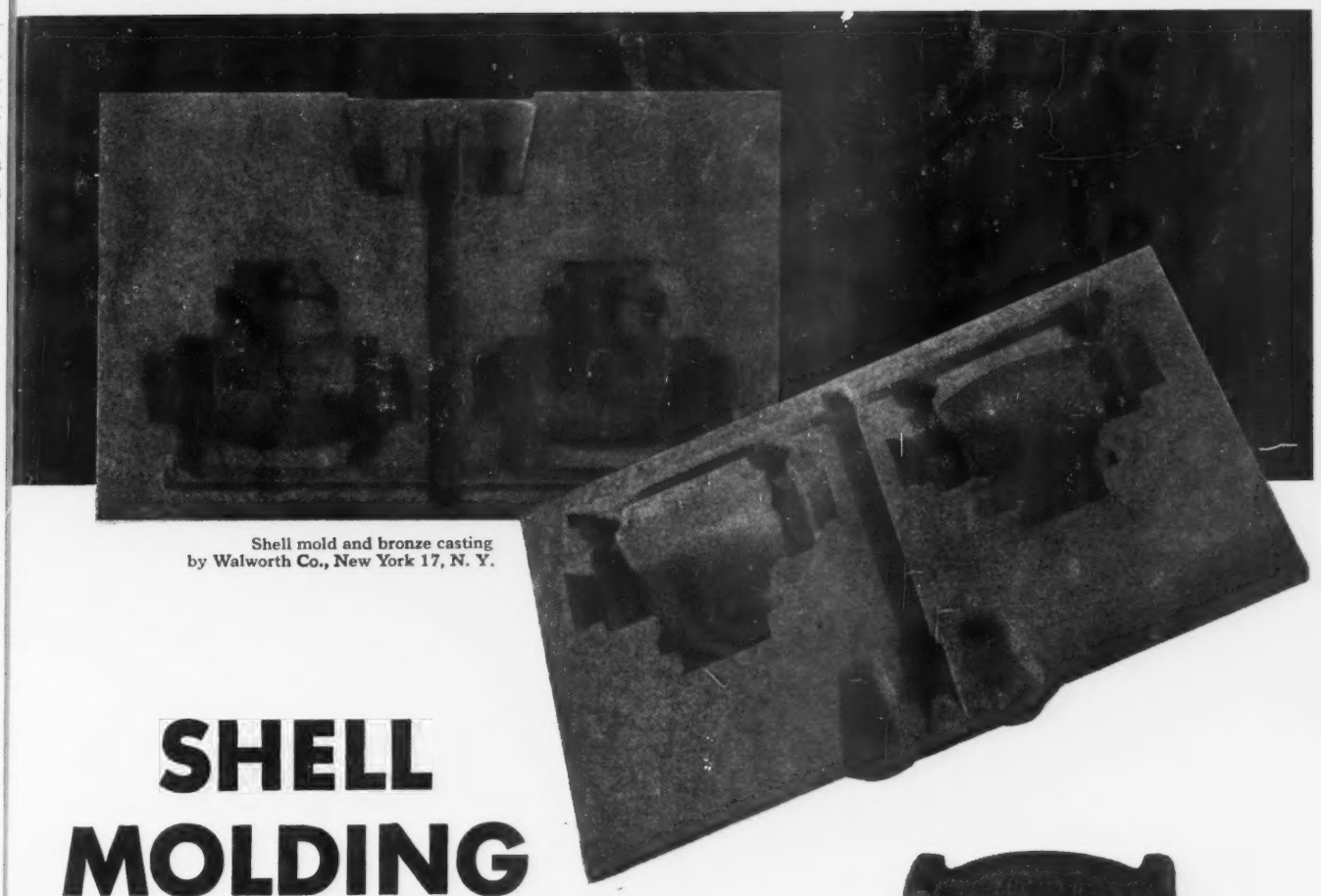
Energy To Spare: During the Metal Show I had an interesting visit with Harry H. Harris of General Alloys, Boston, and Alloy Engineering,

Champaign, Ill., and went over some of the research work that is being carried on at the Illinois plant. Wish I could borrow a little of Harry's energy. The illustration shows Vice Adm. Gerald F. Bogan, retired (left) visiting with Harry at the Champaign plant.

—o—

Greetings: And from all of us on FOUNDRY to our readers everywhere, best wishes for a happy and prosperous New Year, and may 1953 bring peace to this troubled world.

—F.G.S.



Shell mold and bronze casting
by Walworth Co., New York 17, N. Y.

SHELL MOLDING

and Long-Run Production Schedules

When metal parts must be produced on long-run production schedules, foundries should consider the *shell molding* process. This improved foundry technique employs stable, lightweight shell molds made of fine-grained sands bonded with BAKELITE Phenolic Resins. Yielding castings that are almost pattern-smooth, the shell molding process can result in important time savings for both foundries and their customers. Here are some specific advantages:

For Foundries:

- Molds are light in weight, are easily handled and moved about.
- Molds can be stored until needed without deteriorating.
- Ninety to ninety-five per cent less sand is used.
- More good castings are yielded per ton of metal poured.
- Laborious surface finishing of castings is reduced.
- Complicated thin sections are cast with greater accuracy.

For Users of Castings:

- Castings have almost pattern-smooth surfaces, and fine detail.
- Pieces are cast to closer finished dimensions—tolerances as close as .003 to .005 inches per inch.
- Higher percentage of sound, uniform castings means fewer rejects.
- Reduced machining operations result in lowered production costs.

BAKELITE
TRADE-MARK
PHENOLIC RESINS FOR SHELL MOLDING

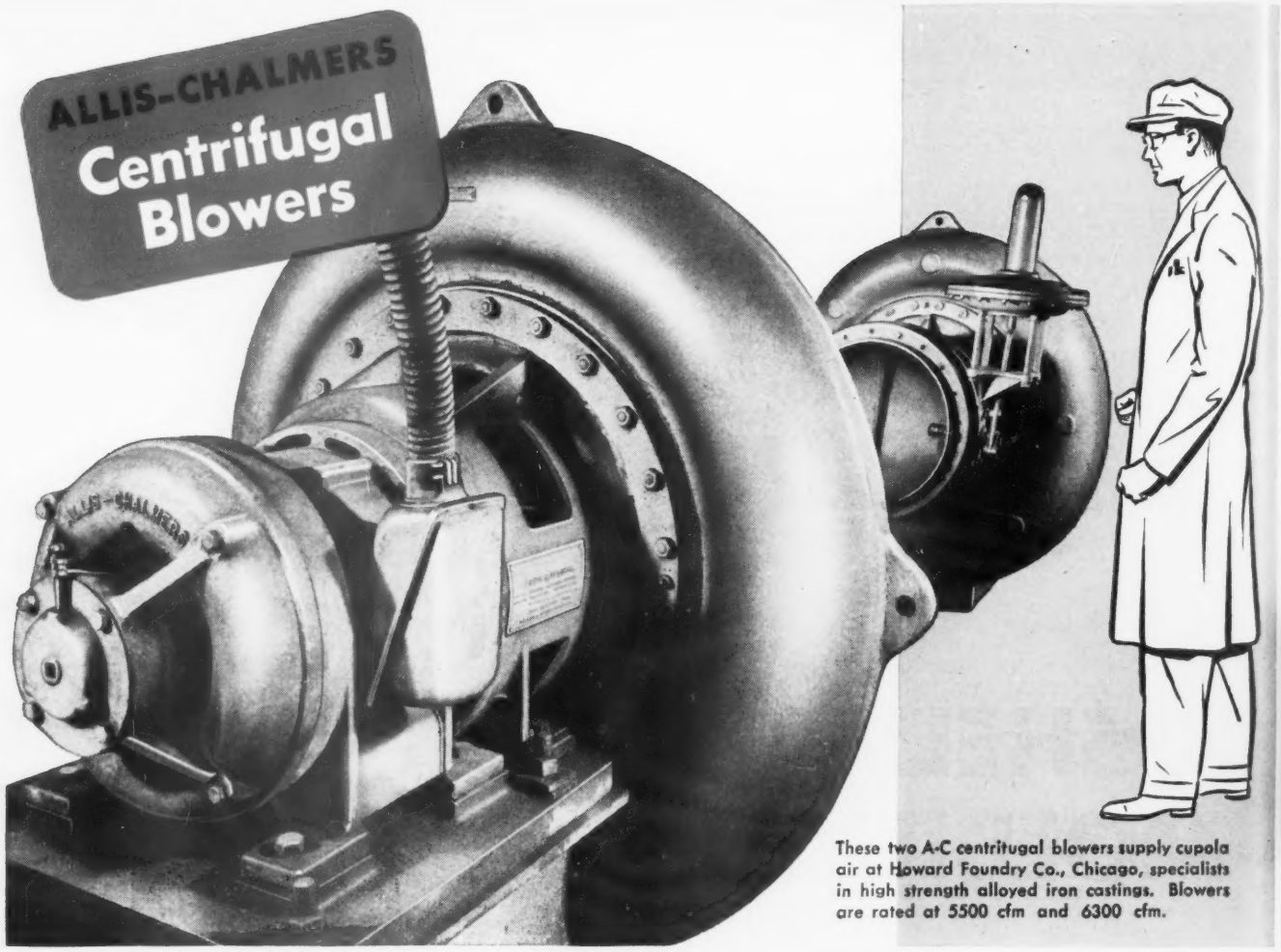
TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
In Canada:
Bakelite Company (Canada) Ltd., Belleville, Ont.

Learn more about Shell Molding!
Send for this Free Booklet!

BAKELITE COMPANY, Dept. OR-29
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.
Please mail my free copy of the Booklet C-8, "BAKELITE Phenolic Resins for the Shell Molding Process."

*Name*_____ *Title*_____
*Company*_____
*Street*_____ *City*_____ *Zone*____ *State*_____



These two A-C centrifugal blowers supply cupola air at Howard Foundry Co., Chicago, specialists in high strength alloyed iron castings. Blowers are rated at 5500 cfm and 6300 cfm.

Compact, Close-Coupled

★ Close-coupled Allis-Chalmers blower design reduces space requirement.

★ Low noise level, long-lived cast iron casing.

★ Anti-friction bearings support the impeller and motor rotor, the only moving parts.

VITAL RELIABILITY in cupola operation is assured with Allis-Chalmers centrifugal blowers. Cupola operation is especially critical at the Howard Foundry Company since the component elements in production of malleable iron demand precise control.

A cast iron casing in Allis-Chalmers blowers reduces vibration, lowers noise level, and assures long life. With the impeller "overhung" on the motor shaft and supported by anti-friction bearings, the installation is compact and readily accessible.

The constant air weight control on the blower inlet automatically delivers more or less air, as required, without the necessity of blowing off to atmosphere and wasting power.

For more information call your nearest A-C sales office or write to Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 16B6048B. A-3838

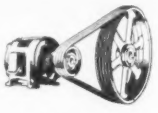
Foundromatic and *Regulex* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

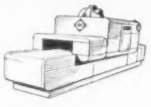
A-C ALLIS-CHALMERS

Foundry Equipment for Bigger Output—Better Working Conditions!

Foundromatic Shakeouts

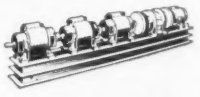


Motors-Drives Control



Foundromatic Core Dryer

Induction Heating & Melting



Regulex Arc Furnace Control

ANNOUNCING . . .

The Greatest Advance in Molding Machines In Over Half a Century!

Taccone's Exclusive, Patented *

Rubber Pneumatic Diaphragm

*** FULLY PATENTED**

OUR model TD-4, which has been in continuous operation in a large production foundry for over a year, has quadrupled production without adding to direct labor cost.

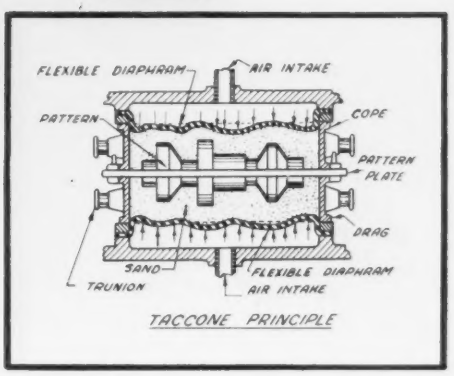
Each half of the flask is 36″W x 80″L x 10″H and is producing at the rate of 90 complete molds per hour, making it the world's largest flask producing at that rate.

It has a pneumatic rubber diaphragm that is basically simple in principle and embodies a minimum of moving parts.

This is how it works. Sand is compressed in the pattern to a uniform mold hardness by means of inflating a rubber diaphragm with air.

Mold hardness is governed by controlling the air pressure injected into diaphragm.

For additional information on Model TD-4 and smaller machines write to the address below.



TACCONE PRINCIPLE

- **UNIFORM MOLD HARDNESS**
- **PRECISION MOLDING ATTAINED**
- **CASTING WEIGHTS HELD WITHIN OUNCES**
- **OPERATES ON CONVENTIONAL GREEN SAND MIXES**
- **MINIMUM WEAR ON PATTERNS**
- **WOODEN OR PLASTIC PATTERNS USED FOR PRODUCTION**
- **NO FOUNDATION NECESSARY**
- **INSTANT MOLDING CYCLE**

TACCONE PNEUMATIC FOUNDRY EQUIPMENT CORP.

Dept. FJ-53, P. O. Box 468, North East, Penna.

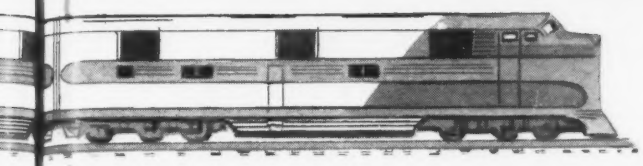
NOTE: We have recently acquired the facilities of the Arcade Molding Machine Co. of Freeport, Ill., from Rockwell Engineering Co. Orders, inquiries, etc. should be addressed to: ARCADE MOLDING MACHINE CO., DIVISION TACCONE PNEUMATIC FOUNDRY EQUIPMENT CORP., NORTH EAST, PA.

There goes our 400th SIMPSON *Porto-Muller*®

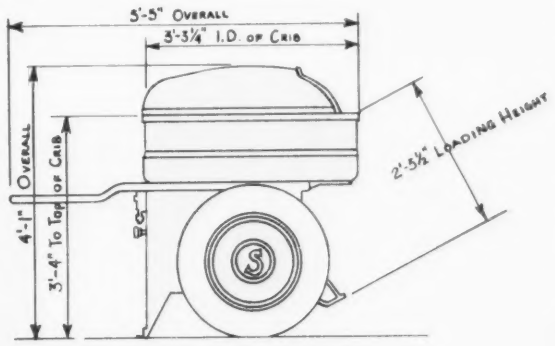
The low cost Simpson Porto-Muller was first introduced in April, 1949. Since that time, we have built *four hundred* of these versatile mixers, and have shipped them to foundries in every part of the country.

The ever-increasing use and acceptance of the Porto-Muller is a real testimonial to its value in providing experienced foundrymen with a fully portable and practical mixer for all types of foundry sand . . . from the slickest core sand mix to the toughest steel sand facing.

Check over the outstanding Porto-Muller features and proof of acceptance on the opposite page—and then have a National Engineer show you how this versatile muller can increase production and casting quality at lower cost.



here are a few reasons for the *Porto-Muller's* popularity:



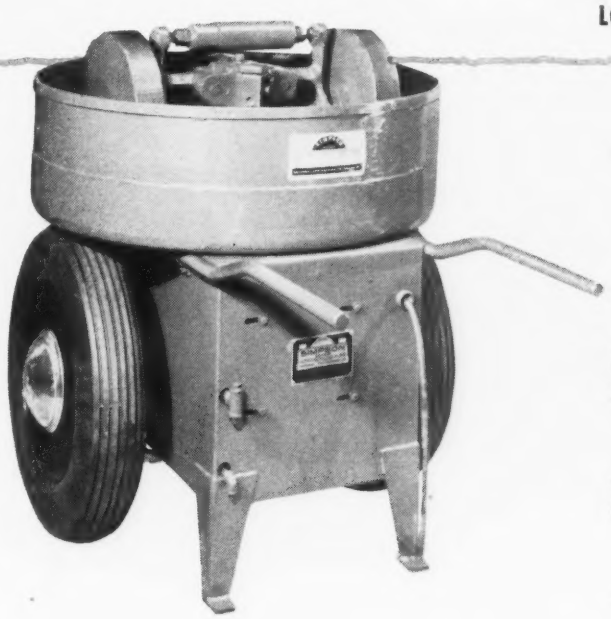
100% PORTABLE . . . *Completely self-contained — no auxiliary hoists or ceiling supports needed.*

BIG CAPACITY . . . . *Easily handles 250 to 300 lbs. of sand.*

READY TO GO . . . *Fully equipped with dust hood, motor starter, electric cable — plug into outlet and you're mulling.*

ADJUSTABLE MULLERS . . . *Spring adjustment pre-loads mullers within a range of 100 to 275 lbs., to provide correct muller weight for all types of sand.*

LOW COST — PROMPT DELIVERY



. . . and here's what typical *Porto-Muller* users have to say . . .

"reduced our casting losses with sand prepared by this machine . . . have increased production and produced smoother castings"
(Gray Iron Foundry, Pennsylvania)

"saving at least 50% on labor and 25% to 50% on core oil . . . getting smooth and better cores"
(Brass Foundry, Michigan)

"saving about 50% of labor cost . . . also reduced binder about 50%"
(Iron Manufacturer, Kansas)

"previously took 4 man-hours to mix 5 wheelbarrows of sand — with Porto-Muller, now takes one man 45 minutes . . . also use about ½ the amount of oil and water, with better results"
(Bronze and Aluminum Foundry, Illinois)

Write for Bulletin 492

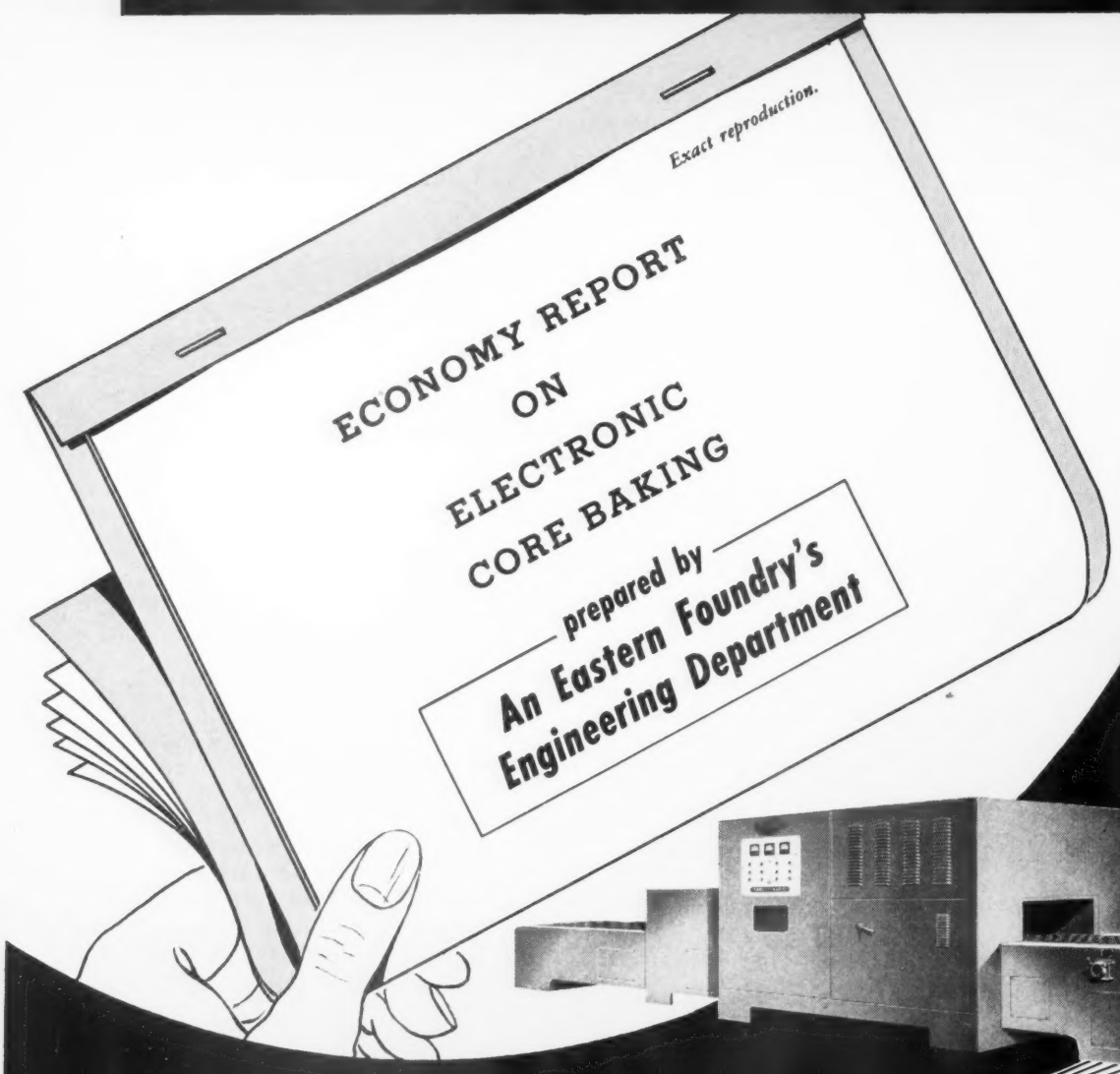
National Engineering Company
(Not Inc.)
608 Machinery Hall Bldg. • Chicago 6, Illinois

SIMPSON *Intensive* MIX-MULLERS

Manufacturers and Selling Agents: For Continental European Countries — George Fisher, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — CASCO ,S. De R.L., Mexico, D.F.

DETROIT PUBLIC LIBRARY

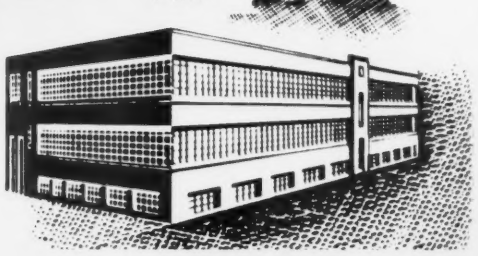
THER-MONIC ...GETS TO THE CORE



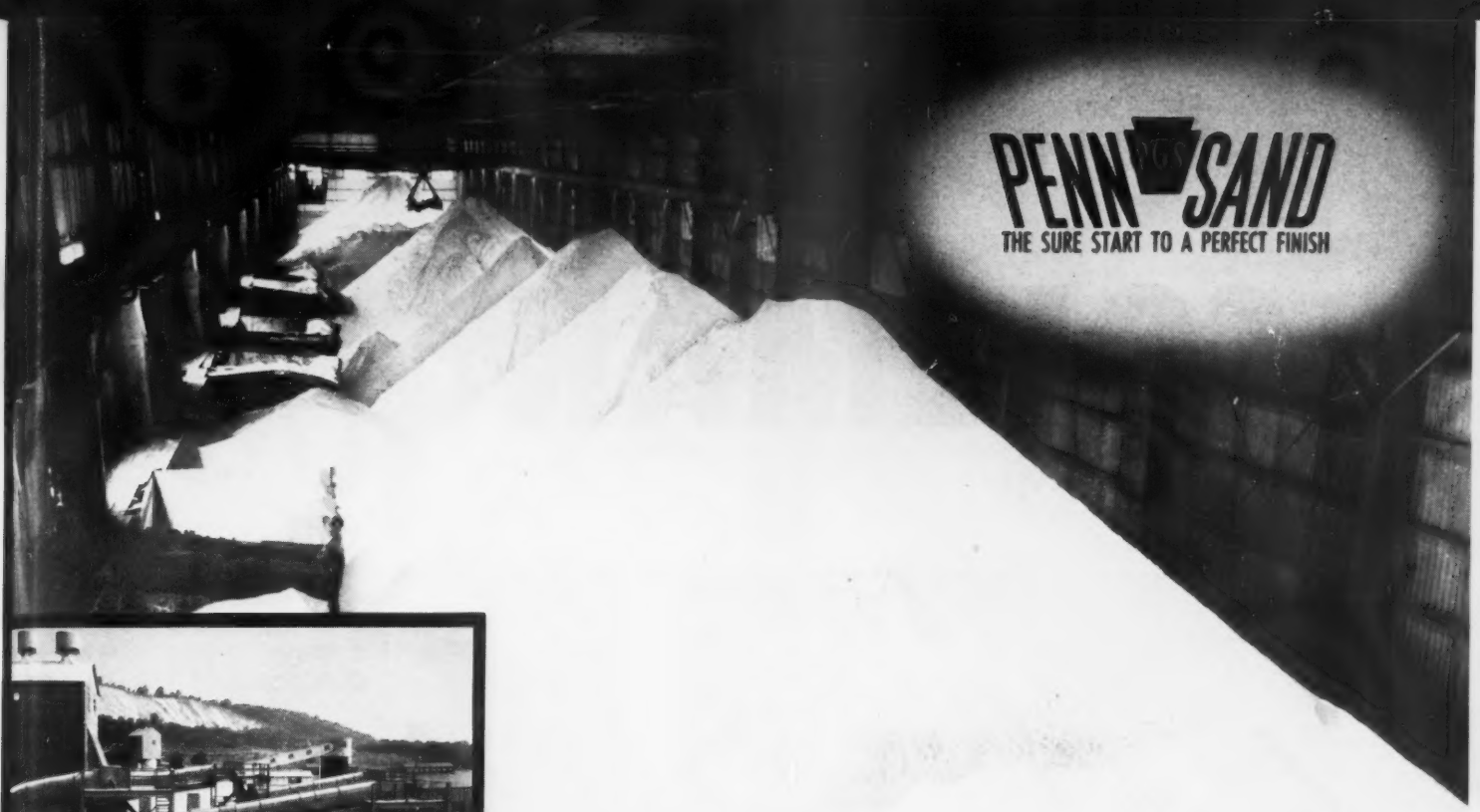
—Report projects $37,605.00 annual core room savings from one electronic core baking unit!

Detailed analysis submitted to management by this foundry's own engineering department resulted in the purchase of THER-MONIC equipment . . . a complete installation which will pay for itself within six months.

Your copy of this conclusive report . . . together with our new catalog will be forwarded upon request.



INDUCTION HEATING CORPORATION
181 WYTHE AVENUE • BROOKLYN 11, N. Y.
Largest Producers of Electronic Heat Treating Equipment



HUGE STORAGE FACILITIES INSURE IMMEDIATE SHIPMENT

Make better... smoother castings

without sacrificing permeability

Use PENN SAND —a "natural" for your foundry

You can get better finish and higher permeability with the same sand—PENN SAND. Unique grain structure and distribution give PENN SAND built-in lower density, which in turn results in both lower confined expansion and higher permeability. These inherent advantages save you time and money by reducing rat tails, veining, scabbing, buckles and other defects.

Join the increasing number of foundrymen who are benefiting by the advantages that make PENN SAND a natural for the foundry industry. Washed, dried and screened grades for steel, gray iron, malleable, brass, bronze, aluminum and magnesium castings.

• Write today for further information and free samples

PENNSYLVANIA GLASS SAND CORP.

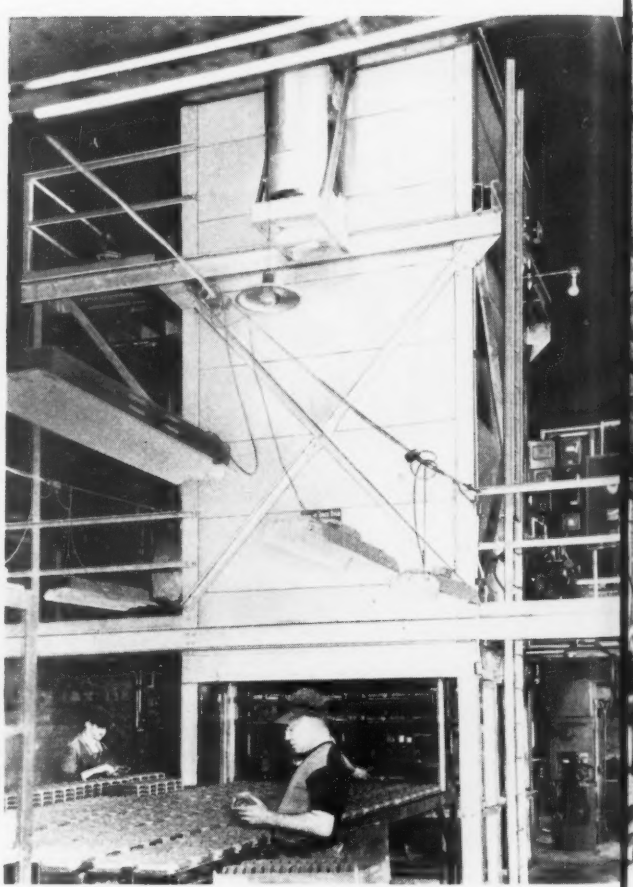
General Sales Offices: First National Bank Building, Pittsburgh 22, Pennsylvania
Eastern Sales Office: Trenton Trust Building, Trenton 8, New Jersey

MOLDING SAND · CORE SAND · SHELL-MOLDING SAND · SANDBLAST SAND · SILICA FLOUR

lowest cost cor

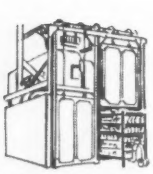
COLEMAN Tower

Coleman Tower Oven at Monroe Steel Castings Company

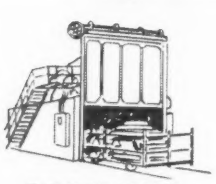


Coleman Tower Oven at Barnes Manufacturing Company

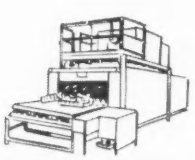
A COMPLETE RANGE OF TYPES: COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement.



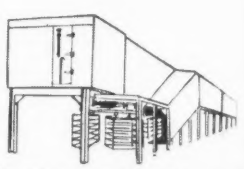
TRANSRACK OVENS



CAR-TYPE OVENS

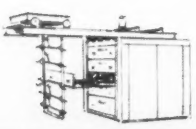


CONTINUOUS REDRY OVENS

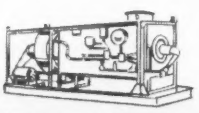


HORIZONTAL CONVEYOR OVENS

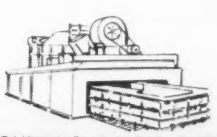
PORTABLE OVENS



ROLLING DRAWER OVENS



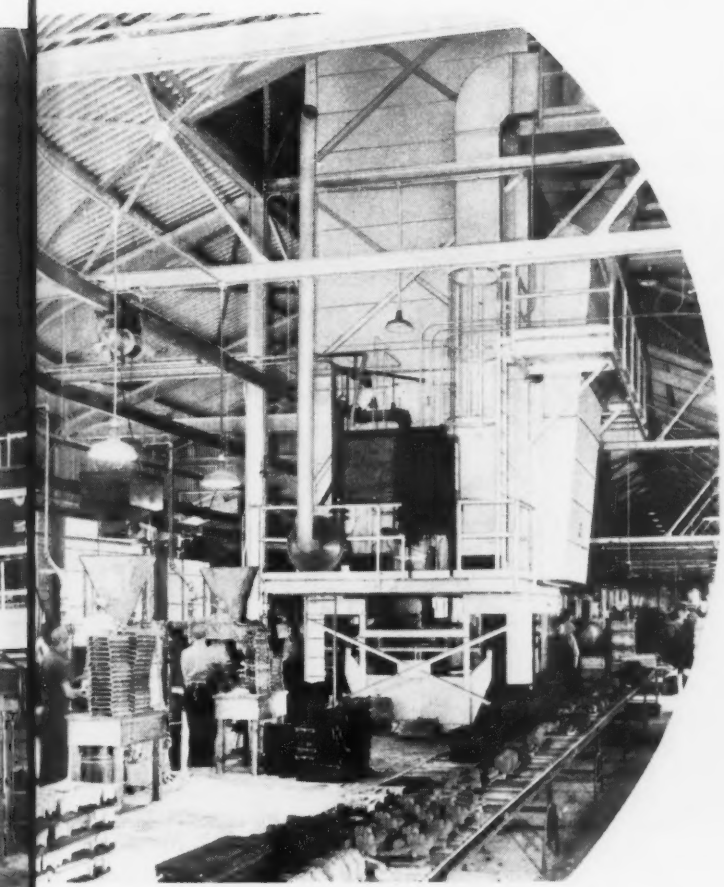
PORTABLE MOLD DRYERS



CONTINUOUS MOLD OVENS

aking method...

OVENS



an Tower Oven at National Sewing Machine Company

No other method compares with Coleman Tower Ovens for core-baking efficiency. Only Coleman Tower Ovens have the exclusive features which enable cores of widely different sizes and shapes to be handled at the same time, all baked with consistent uniformity!

Coleman Tower Ovens have the patented open center which increases oven loading accessibility and improves productivity of coremakers. By eliminating trucks, racks and multiple handling operations, Coleman Tower Ovens provide savings up to 75%.

Hundreds of foundries from coast-to-coast have proved that Coleman Tower Ovens have regularly outperformed any other method of high quality core baking. Our engineers are available without obligation to show you how you can obtain greater core output from less space at remarkable savings...call or write.

Only* COLEMAN TOWER OVENS *offer all these advantages:

EFFICIENT HANDLING METHODS eliminate delays and losses.

PERFECT CORE BAKING ends manpower and casting losses due to make-overs and rejects.

INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.

SUPERIOR WORKING CONDITIONS...cores are cooled and smoked-off before leaving oven.

HEAVY DUTY CONSTRUCTION for continuous dependable performance and economical operation.

GREATEST SAVINGS IN FUEL by using the most economical fuel available.

SAVE BINDER. Proper core baking atmosphere and uniform temperature permit important savings in conventional binders.

USE HIGH SPEED CORE BINDERS. Coleman Ovens have uniform temperature and accurate control to handle temperature-sensitive resins and pre-baked oils.

Write for Bulletin 48

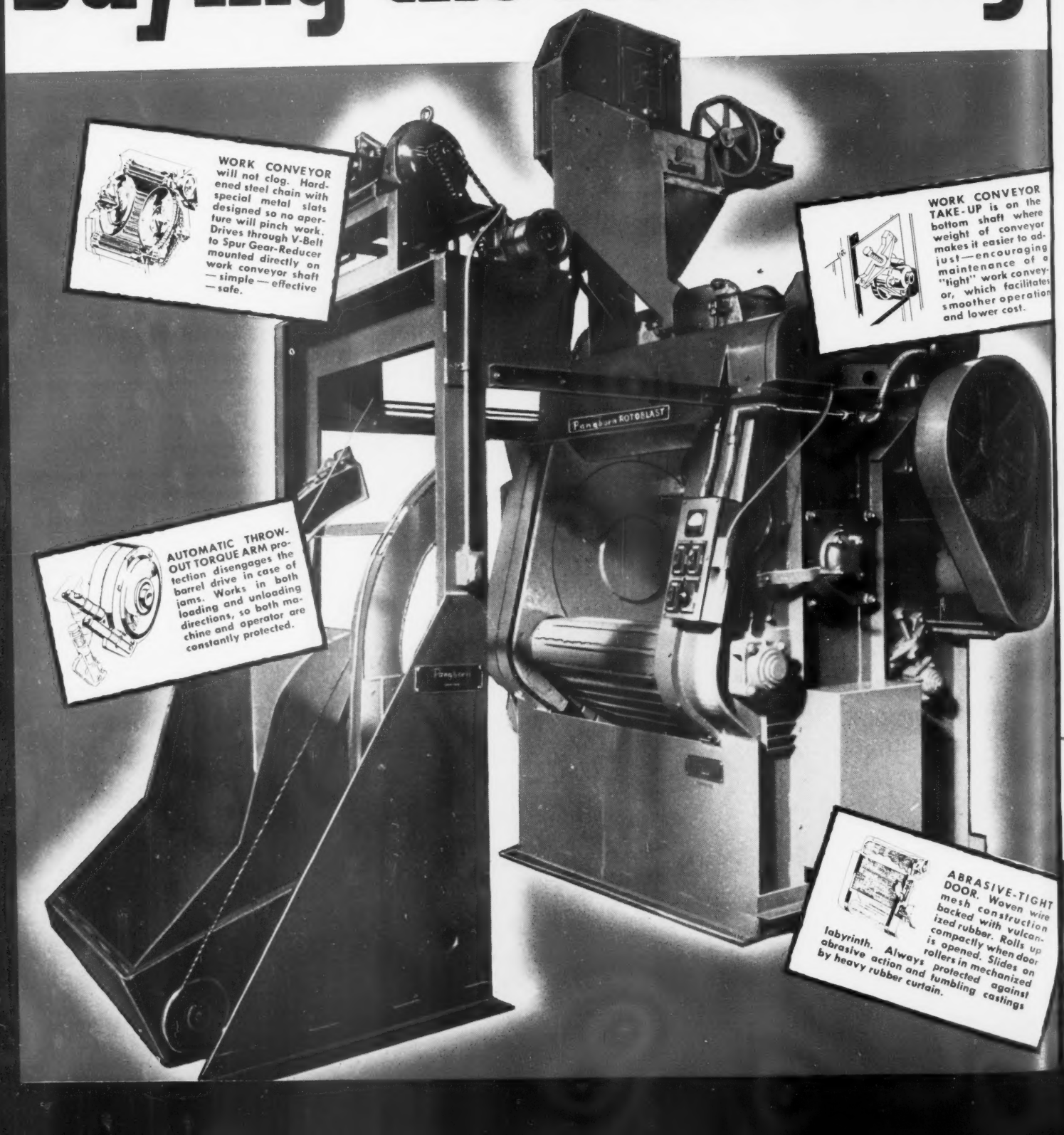
THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD

CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

5 Reasons Why Foun
Buying the New Pangb


WORK CONVEYOR will not clog. Hardened steel chain with special metal slats designed so no aperture will pinch work. Drives through V-Belt to Spur Gear-Reducer mounted directly on work conveyor shaft — simple — effective — safe.
WORK CONVEYOR TAKE-UP is on the bottom shaft where weight of conveyor makes it easier to adjust — encouraging maintenance of a "tight" work conveyor, which facilitates smoother operation and lower cost.
AUTOMATIC THROW-OUT TORQUE ARM protection disengages the barrel drive in case of jams. Works in both loading and unloading directions, so both machine and operator are constantly protected.
ABRASIVE-TIGHT DOOR. Woven wire mesh construction backed with vulcanized rubber. Rolls up compactly when door is opened. Slides on rollers in mechanized labyrinth. Always protected against abrasive action and tumbling castings by heavy rubber curtain.
Pangborn ROTOBLAST

...ries Everywhere are ...rn Blastmaster Barrel

Erie Bronze Co., Erie, Pennsylvania, bought the Blastmaster for rapid cleaning of bronze castings.

Alfred Heller Heat Treating Co., New York, N. Y. selected the Blastmaster for efficient removal of steel scale.

Reddin Iron Works, Syracuse, N. Y., chose the Blastmaster to clean its large output of gray iron.

Emsco Derrick & Equipment Co., Los Angeles, California, purchased the Blastmaster to speed its cleaning of castings.

Elliott Co., Jeannette, Pennsylvania, picked the Blastmaster for thorough cleaning of its production of gray iron castings.

Pangborn's new Blastmaster ROTOBLAST® Barrel is making new friends—and customers—everywhere, as word gets around about its amazing versatility! Bronze . . . gray iron . . . non-ferrous castings . . . forgings . . . the Blastmaster cleans 'em all, faster, cheaper and better! That's because this new barrel uses famous Pangborn ROTOBLAST that does a better job and saves you money these five ways:

SAVES LABOR with push-button operation
SAVES SPACE because machines are compact
SAVES TIME by cleaning more loads per day
SAVES POWER since no compressor is needed
SAVES TOOLS because all scale is removed

If you're interested in better, faster, cheaper blast cleaning, you owe it to yourself to find out more about the Pangborn Blastmaster Barrel. Available in 4 sizes—3, 6, 12, and 18 cu. ft. capacity. For other equipment in the famous Pangborn line, see illustrations elsewhere in this ad. For more details, write for Bulletin No. 223 (Blastmaster Barrel) or No. 214 (all ROTOBLAST equipment), to: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

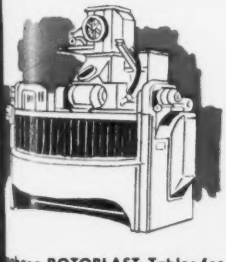
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

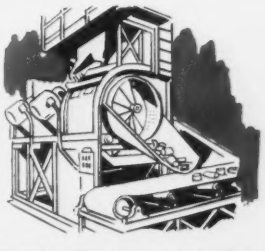
PANGBORN HAS EVERYTHING YOU NEED IN BLAST CLEANING & DUST CONTROL EQUIPMENT



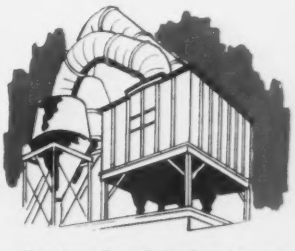
...gborn ROTOBLAST Tables for ...-continuous blast cleaning. ...es and sizes for castings of all ...s and shapes.

Pangborn ROTOBLAST Table-Rooms for general-purpose blast cleaning. An extremely efficient machine for jobbing foundries.

Pangborn Hydro-Sand Blast Rooms for simultaneous blast cleaning and core-removal.

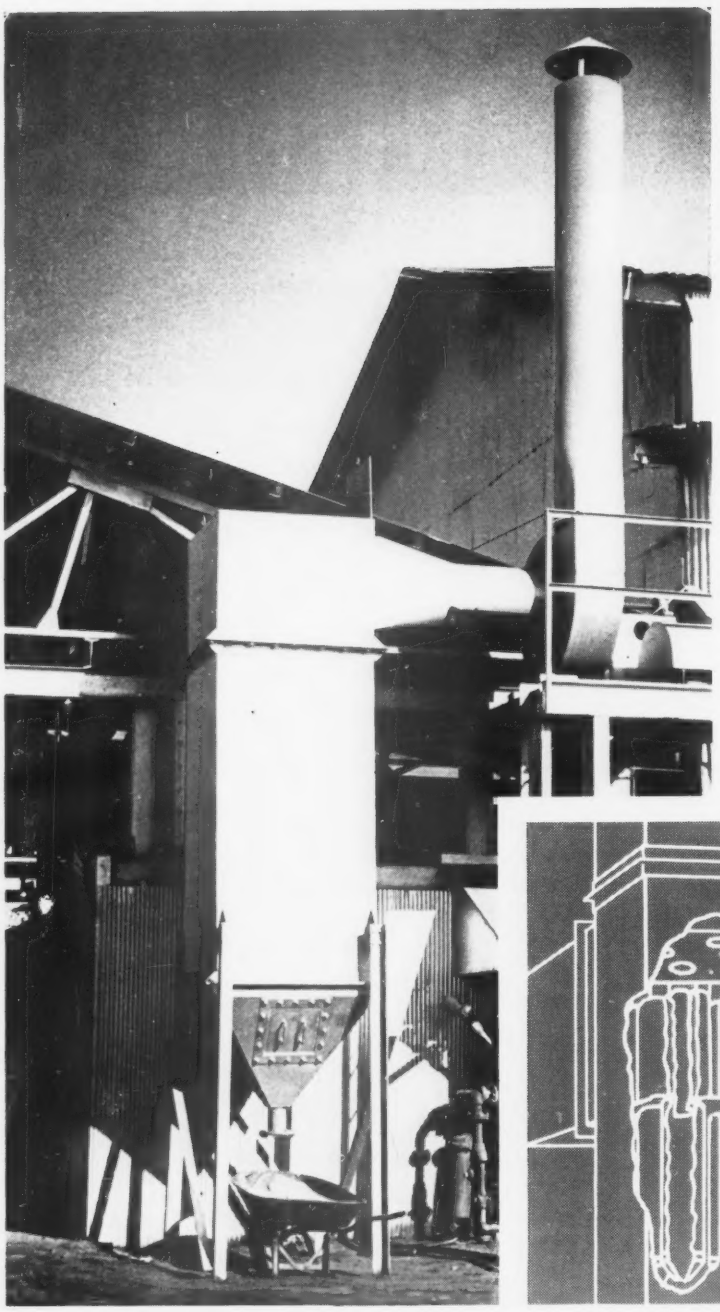


Pangborn "Continuous-Flo" ROTO-BLAST Barrels for cleaning a steady flow of miscellaneous work at high rate of production.



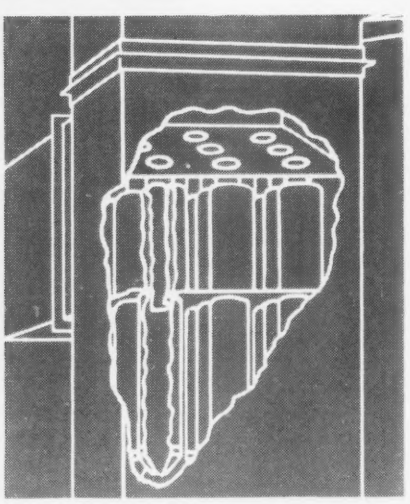
Pangborn Dust Control equipment for every purpose traps dust at the source, saving money and improving work conditions.

WHIRLEX DUST COLLECTOR SOLVES SHOT-BLASTING DUST PROBLEMS AT SOUTHERN CAR & MFG. CO.



DUST NUISANCE WAS SERIOUS HANDICAP TO WORKMEN IN FOUNDRY

When raw castings are completed at "Southern Car", they are moved directly to the shot-blasting room where high velocity shot-blasting is used to remove sand and scale. Formerly, the dust exhausting from the ventilating system caused a serious nuisance with frequent complaints from neighboring manufacturers. Dust blowing into the foundry made conditions very unpleasant for the workmen. After a discussion of the problem, engineers of The Fly Ash Arrester Corporation performed tests which proved that the highly efficient "Whirlex" MTSA-9CY18S multicyclone could eliminate the nuisance.



NO COMPLAINTS FROM WHIRLEX'S DISCHARGE

Since the installation of the "Whirlex", the discharge from the process has been so light that no complaints whatsoever have been received from operation of the shot-blasting room. The "Whirlex" multi-cyclone dust collector is constructed of heavy steel cyclone units built into a flanged casing. Cyclone elements and collector casing are of 3/16" plate. This highly efficient collector is shipped in complete, all welded units with flanged connections. Erection is simply a matter of bolting these units into place.

Write today for descriptive literature and the address of your nearest representative.

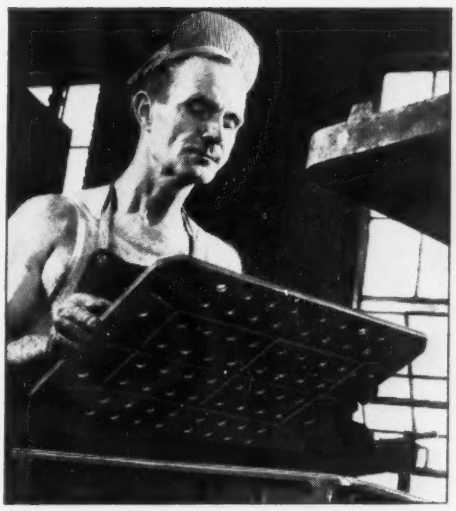
THE FLY ASH ARRESTOR CORPORATION

BIRMINGHAM ALABAMA

202 North First Street

Telephone 54-6676

"EDCO BOTTOM BOARDS eliminate swelled castings"



Above photo shows Mid-City Foundry Company molder placing EDCO DOWMETAL Bottom Board on flask preparatory to pressing. Mid-City Foundry produces high quality gray iron and alloy castings.

Take a tip from E. F. Dublinski. He speaks from experience in saying —"EDCO DOWMETAL Bottom Boards eliminate swelled castings". Since switching to magnesium boards, Mid-City Foundry does not have castings ruined through swelling caused by depressions burned into out-dated wood boards.

EDCO DOWMETAL Bottom Boards help produce castings that are true to pattern. The exclusive grooved and vented design permits escape of gasses, and insures mold stability. Causes for rejects are kept to a minimum.

"We consider EDCO DOWMETAL Bottom Boards as permanent equipment at Mid-City," adds E. F. Dublinski, "because they'll outlast wooden boards at least 30 to 1 and in no time at all pay for themselves."

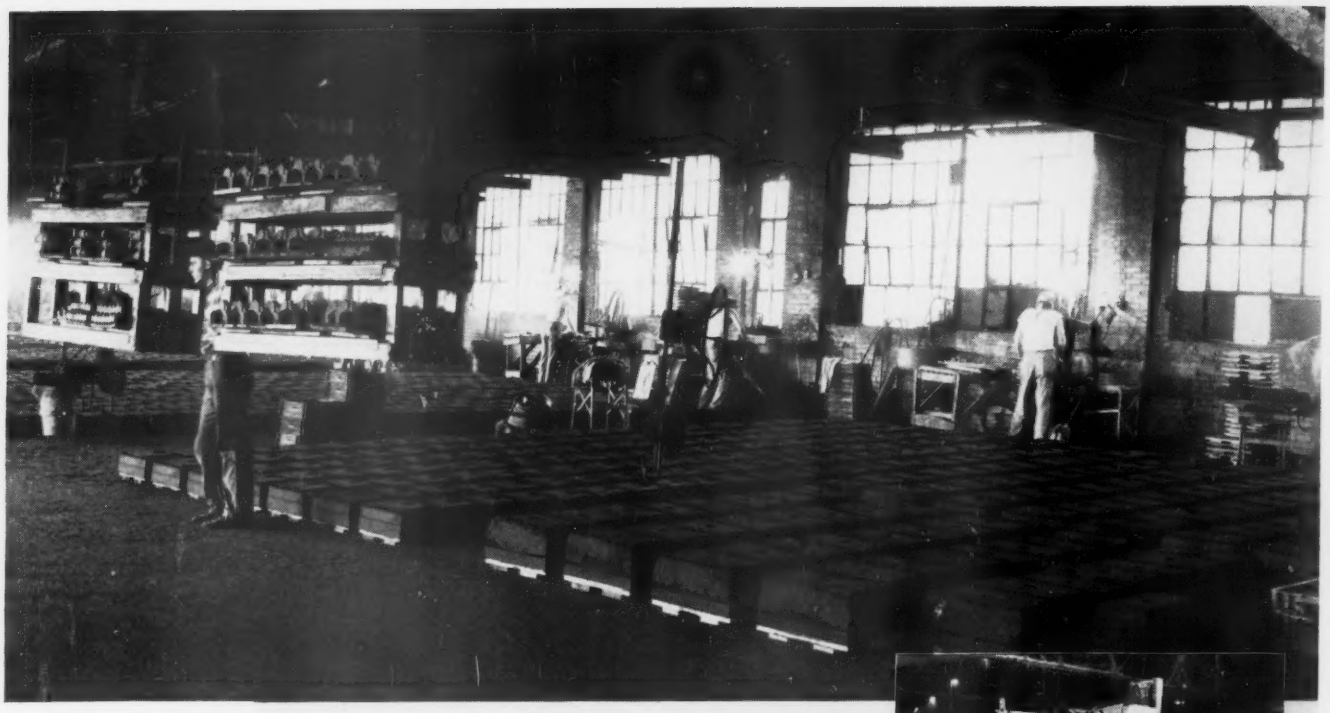
Your molders will like handling these boards because they are light in weight, easy to stack, and there's no danger of splinters. EDCO DOWMETAL Bottom Boards will not warp or rot—there are no nails to come out, nothing to break or split—no upkeep.

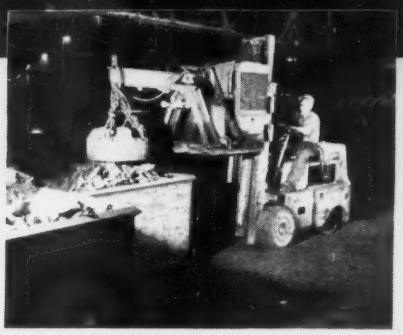
Write us, or phone CApitol 7-2060 for price schedule and list of 74 standard sizes available from stock.

CHRISTIANSEN CORPORATION

1517 N. KILPATRICK AVENUE • CHICAGO 51, ILLINOIS

Aluminum Alloy Ingots • Zinc Base Casting Alloys





Knight Foundry Services include:

- Foundry engineering
- Survey of facilities
- Foundry design
- Construction
- Mechanization
- Modernization
- Materials Handling
- Production Control
- Cost Control
- Industrial engineering
- Wage incentives
- Organization
- Management

Complete

Modernization Program

Amortized in *Less* than a year through savings in unit labor costs

A complete operational analysis of this plant was made by experienced Knight engineers. Their survey proved that modernization, rather than complete mechanization, would increase production per man hour, establish an equitable rate structure, and eliminate overtime which amounted to 5% of existing labor costs.

The modernization program, based on the relocation of equipment, motorization, and improved methods, has been carried out. In addition to achieving the objectives above, it has also resulted in improved quality control which reduced scrap waste by 50%.

This plant is a good place to work.

Whatever your industrial problem, you will benefit by the experience of Knight engineers. For prompt attention, call our Chicago or New York office.

EVIDENCE OF EXPERIENCE

Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

600 W. Jackson Blvd., Chicago 6

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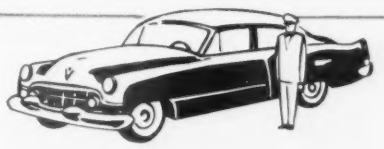
for those better BUFFALO PATTERNS"

Yes, busy foundry men come back to Buffalo again and again for their patterns. There's a good reason for this, and it's pretty close to their pocketbooks and their peace of mind.

Here, they have learned by experience, is the type of engineering that *minutely* plans every detail of every job and the kind of craftsmanship that *precisely* follows through on these plans. They also know that there is NEVER any adapting or extra rigging to do on a Buffalo Pattern. Buffalo equipment always fits their foundry and production schedules like a tailor-made coat. That gives them real peace of mind. Once they get into production, they know that a Buffalo Pattern will deliver a real profit-plus, because their scrap ratio will be at an unbelievable low. After one experience, you'll "love" to come to Buffalo, too! Why not try it?

BE OUR GUEST

Just let us know when you are coming to Buffalo on pattern business. One of our cars will meet you at your plane or train and transport you to our club where you will be our guest during your stay.



Production and Experimental Pattern Equipment • Models, Machined Parts, Jigs and Templates • Shell Mold Pattern Equipment • Permanent Molds for Foundries, Injection Plastics and Reinforced Plastics Pattern Engineering Drawings • Forging Dies • Non-Ferrous Castings • Shell Mold Castings • Metallizing

BUFFALO PATTERN WORKS, INC. • **832 HERTEL AVE., BUFFALO 16, N. Y.**

DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

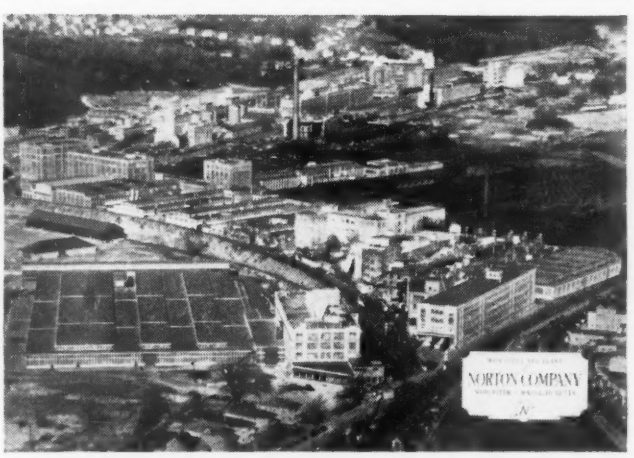
How Norton brings you the "TOUCH OF GOLD" that adds more value to every grinding job

Grinding, the most universal, most basic of all production processes, is the true "Touch of Gold" that increases the usefulness — and the value — of every manufactured article. That's what happens every time Norton grinding wheels touch the grinding jobs *you* do.

Here are the facts on how Norton leads the field in producing and improving the "Touch of Gold" for you and for all industry.

FIRST IN SIZE

At "Norton City" you'll find over a mile of buildings and thousands of skilled workers, constituting the greatest single supply source of abrasives and abrasive products — world headquarters for your "Touch of Gold". Here also is the world's newest, most modern grinding machine plant, and the famous Norton School of Grinding.



FIRST IN RESEARCH

At Norton over 100 trained technicians, in 19 specialized laboratories, are constantly engaged in product improvement and application. This includes not only the development of new abrasives, bonds and processing techniques, but cooperation with customers in the solution of everyday grinding problems. For the "Touch of Gold" that will solve your own grinding difficulties, look to the organization that leads all others in abrasive development. Look to Norton!

Make sure your grinding gets the top value-adding "TOUCH OF GOLD" — with Norton abrasive products

From Norton laboratories come "TOUCH OF GOLD" exclusives like these

Norton New-Process Wheels are unequalled for uniform structure, identical performance and long, even wear.

32 ALUNDUM* Abrasive, another Norton "first", is one of the most revolutionary developments in abrasive history.

NORBIDE* Abrasive, hardest man-made material, replaces costly diamond dust in many polishing and lapping jobs.

FIRST IN PRODUCT-RANGE

Norton offers you the most complete line of abrasive products, all manufactured to strictest quality control standards. Norton ALUNDUM* abrasives and CRYSTOLON* abrasives, together with Norton-developed bonds, make available hundreds of thousands of grinding combinations.

FIRST IN SERVICE

1. **Your Norton Abrasive Engineer** is skilled in every detail of grinding wheel manufacture and application. He's ready to go into your plant, study your grinding problems and help you find the money-saving answers.

2. **Norton Warehouses** are located in key industrial centers. Each contains huge stocks, highly trained personnel and special wheel alteration equipment. And they are backed by the huge stocks at Worcester — further assurance that you'll get Norton wheels whenever you need them, wherever you're located.

3. **Your Norton Distributor,** with plenty of practical experience, can give you valuable help in selecting the right Norton wheels. Your distributor is careful to maintain always adequate stocks, selected to meet the particular needs of your area. He is your direct connecting link with the entire Norton organization — world headquarters for the "Touch of Gold" that means more profitable grinding for *you*. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

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ABRASIVES
Making better products to make other products better

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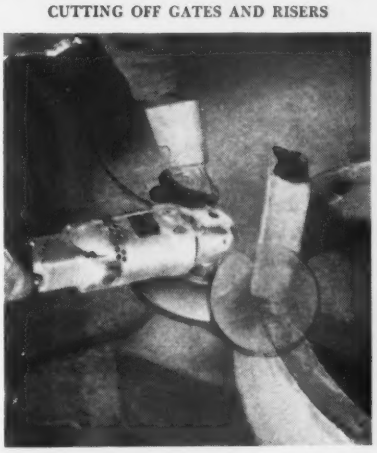
FLOOR STAND GRINDING

SWING FRAME GRINDING

CUTTING OFF GATES AND RISERS

CLEANING WITH MOUNTED POINTS



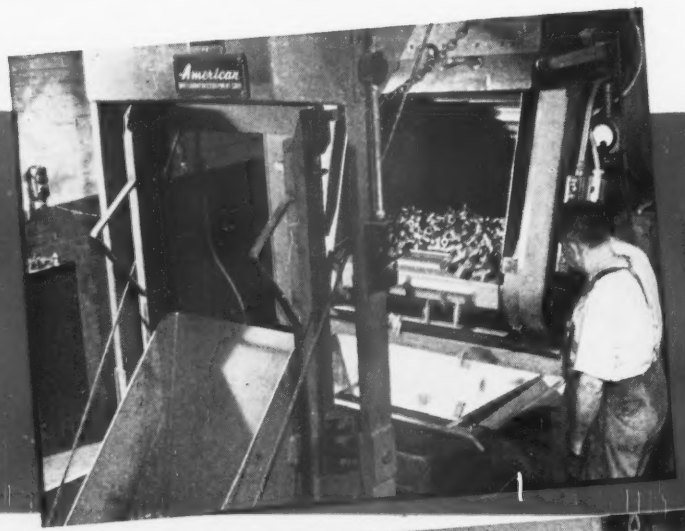
NOTCHING GATES AND RISERS

SMOOTHING ROUGH SPOTS

SURFACING WITH DISCS

TUMBLING CASTINGS

Wheelabrator® save.



SMAL

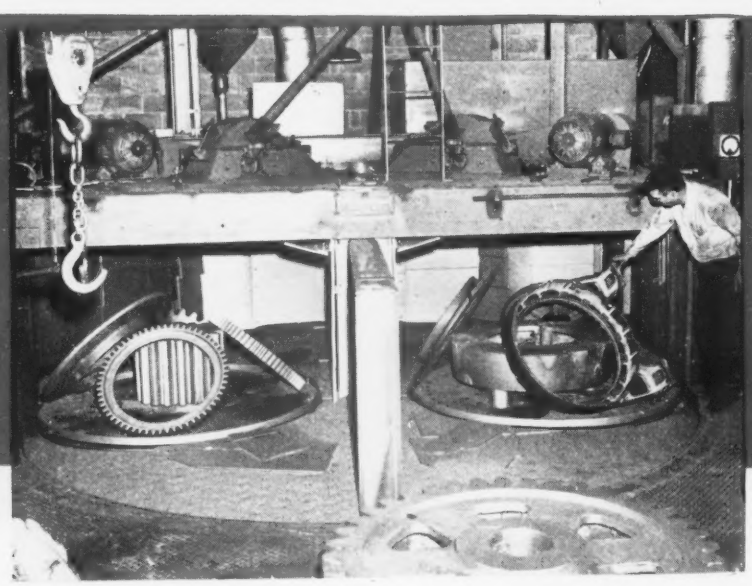
WHEELABRATOR SAVES
$1108 a year for the Welsbach Corp.

Savings resulting from the installation of a Wheelabr Tumblast at the Kitson Division of the Welsbach Corp tion have more than repaid the investment. The Whe brator now cleans castings in three to four minutes formerly required 45 minutes by the old method.

MEDIU

WHEELABRATOR SAVES
$4777.50 a year for Auto Stove Wo

One Wheelabrator replaced 6 tumbling mills at Auto Stove Works, New Athens, Illinois and reduced cleaning costs $95.55 per week. It cleans castings thoroughly that tools now last longer and the overall efficiency of the foundry has been improved.



LARG

WHEELABRATOR SAVES
$10,275 a year for Sawbrook Steel Castings Co.

The Wheelabrator Twin Table, installed at Sawbrook Steel Castings Co., is effecting a direct traceable saving of $41.10 every working day. This machine cleans castings weighing from 50 lbs. to 3500 lbs. each. It reduced operating and maintenance costs to a min

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.

This new, informative book gives complete, concise information on all phases of Wheelabrator airless blast cleaning. Write today for Catalog No. 74-A.

THE AMERICAN MOLDER

...oney for any size foundry

	FORMER METHOD	WHEELABRATOR METHOD	
MACHINE	Two wet tumblers	27″ x 36″ Wheelabrator Tumblast (5 cu. ft. capacity)	
PRODUCTION	1.74 tons daily	1.92 tons daily	
COST per ton	$6.75	$4.45	SAVINGS $2.31 per ton $1108.00 per year
MACHINE	8 tumbling mills	36″ x 42″ Wheelabrator Tumblast (11½ cu.ft. capacity)	
PRODUCTION	12 tons in 9 hours	13 tons in 7 hours	
LABOR REQUIREMENTS	3 men @ 9 hours (27 man hours)	1 man @ 8 hours (8 man hours)	SAVINGS $1.47 per ton $4777.50 per year
MACHINE	Airblast Room and Humane Airblast Table	72″ Wheelabrator Twin Table with three Wheelabrator Units	
PRODUCTION	30 tons daily	30 tons daily	
LABOR REQUIREMENTS	6 men, 50 man hours daily	3 men, 24 man hours daily	SAVINGS $1.37 per ton $10,275.00 per year
COST per ton	$4.75	$3.38	

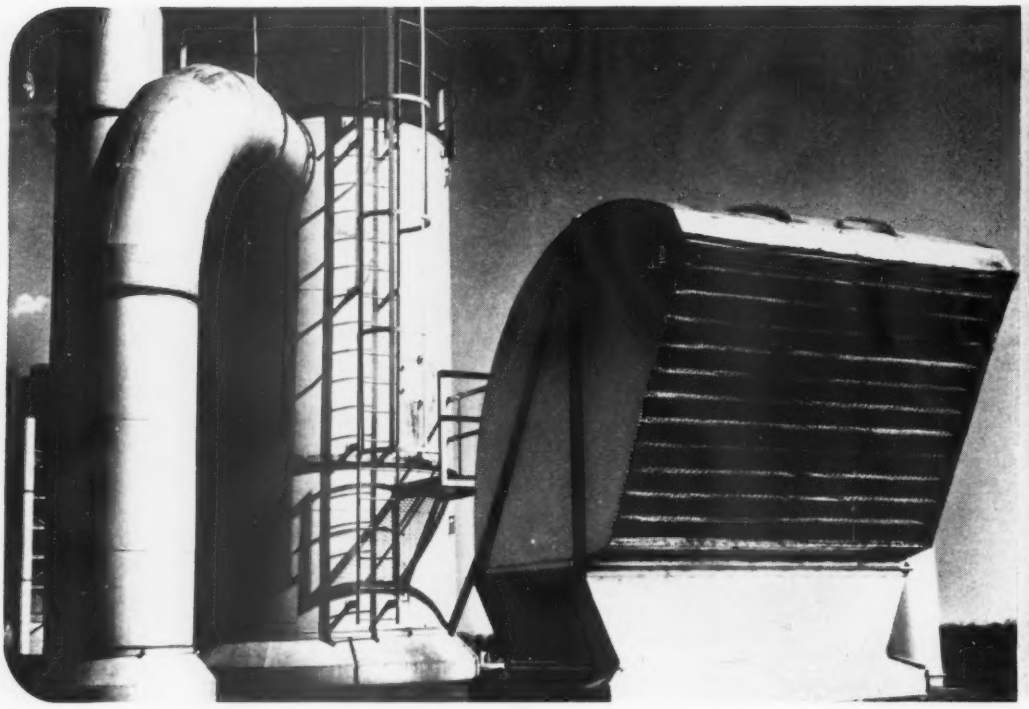
American

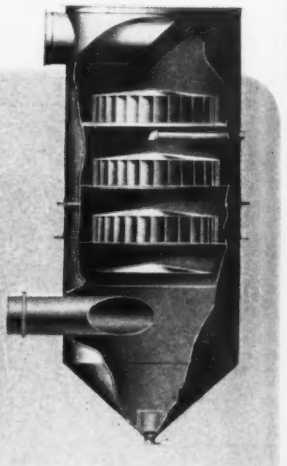
WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit St., Mishawaka, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

INDEPENDENT LABORATORY TESTS FIND MULTI-WASH DUST COLLECTOR SYSTEM 99.9% Efficient





Model JC Collector — For most shakeouts and sand preparation systems. Model IC Collector—For hot or dry shakeouts and most cleaning room applications. Model HC Collector—For highest collecting efficiency of extremely fine materials. *All models are made in ranges from 1000-36,000 c.f.m.*

A recent Schneible Multi-Wash installation in a nationally known foundry, has been job-tested by a prominent laboratory. The findings—99.9% efficient on overall normal operation.

This test was conducted to determine the efficiency of dust removal by weight and by count in four particle size ranges, 15 to 30 microns, 5 to 15 microns, 2 to 5 microns and under 2 microns with a type IC Multi-Wash Collector having 4½ impingement stages. During sampling it was handling 33,620 c.f.m under normal foundry production.

These tests, based on a number of dust particles, showed an efficiency of 99.9%. Based on weight efficiency the percentage was even higher. The chemical analysis was based on dehydrated samples which were so small on the amount remaining from the discharge, that actual silica or other analysis could not be made.

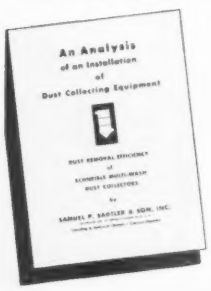
If you are considering any dust collecting system, you can't find a more highly efficient system than Multi-Wash. *Write for your free copy of the complete analysis of the above installation* and *see how you, too, can benefit with Multi-Wash.*

CLAUDE B. SCHNEIBLE CO.

P. O. BOX 81, NORTH END STATION
DETROIT 2, MICHIGAN

Free

Write for your copy today



PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Weai Proof" Centrifugal Slurry Pumps

SCHNEIBLE

Late Foundry News

December 23, 1952

CASTING PRICES: Malleable iron foundries are permitted to raise their ceiling prices 6.2 per cent, effective Dec. 19. This results from an industry earnings standard survey made by OPS and is authorized by a supplementary regulation to CPR-60. Similar surveys have been undertaken in the gray iron, steel and nonferrous foundry industries. While they have not been completed, it is understood they are far enough along to warrant expectations that some price relief also will be granted those groups. A survey of high-alloy casting foundries has been completed, but the findings apparently developed no support for price increases by that industry.

PRICE ACTION SPEEDED: In an effort to quicken action on applications for price adjustments, OPS has appointed a board of five officials to expedite industry earnings surveys in connection with them. Under the industry earnings standard, an industry in which current earnings, adjusted to net worth, have fallen below 85 per cent of average earnings during the best three of the four years 1946-1949 is entitled to increased price ceilings sufficient to bring earnings up to the 85 per cent level.

FOUNDRY EXPENDITURES: Foundries boosted their investment in plants and equipment sharply in 1951, according to a report just released by the Bureau of Census. Total spent was $167,927,000, about 86 per cent of it by ferrous foundries. This covers only plants in operation in 1951. Bulk of the expenditure—$117,663,000—went for machinery and equipment, the remainder for new structures and plant additions. Compared with 1950 this was a 140 per cent increase. Expenditures by all industries rose only 40 per cent, those by the steel industry 113 per cent. Foundry spending in other reported years was $58 million in 1949 and $95 million in 1947.

PROPHETS BULLISH: The annual crop of forecasts concerning business during the new year leans definitely to the optimistic side. This applies to expectations of government agencies as well as business groups and individuals. A new peak in construction work at more than $32 billion is forecast jointly by the Bureau of Labor Statistics and Department of Commerce. Cheerfulness of automobile builders and domestic appliance manufacturers is based partly on current and prospective improvement in metals supply. Even the longer range view appears good to the Department of Commerce. It thinks that the drop-off in production for defense a couple years hence will still find the country able to consume what it can produce.

CHROMIUM RAISED: Prices of ferrochrome, chromium metal and other chromium products have been advanced by OPS in a new ceiling price regulation. These products formerly were covered by the General Ceiling Price Regulation. High-carbon products have been raised 3 cents per pound of contained chromium; low carbon products are up 4 cents a pound. Cost of imported chrome ore, from which most ferrochromium is produced, has increased substantially since June, 1950, while the price of ferrochromium has been frozen at the November, 1950 level.

COPPER ALLOCATION: Foundries requiring 10,000 pounds or less of copper raw materials monthly now may self-certify such allocation to their suppliers. They need not file form NPA F-83 as formerly. This procedure is permitted under a revision of M-16. Certification for those foundries using over 10,000 pounds of copper raw materials monthly remains the same.

URGE EXPORT BAN: Although stocks of iron and steel scrap are fairly large, industry advisory committees to NPA have recommended that scrap exports be limited to Canada and Mexico. On Oct. 31, steel mills and foundries had scrap inventories of 6.2 million tons, enough for 60 days' operation.

PERSONALS: William A. Meissner Jr., recently chief of the Foundry Branch, Copper Division, NPA, has been appointed deputy director of the Copper Division . . . Ernest A. Schoefer, formerly executive secretary of the Alloy Casting Institute, has been named to the newly created office of executive vice president . . . William B. Gilmour, manager of commercial research, Inland Steel Co., Chicago, is on a six month's leave to serve as special assistant to the director of NPA's Iron and Steel Division . . . Hy Bornstein, Deere & Co., Moline, Ill., temporarily is acting as metallurgical adviser to the Israel government under the Technical Assistance Program of UN . . . A. J. McDonald, vice president, American Steel Foundries,

and for the last two years with NPA, has assumed charge of the company's Washington office, 218 Hay Adams House. J. Ross Drever has resumed assignment in the Chicago general office . . . George J. Leroux, assistant manager, Cleveland Works, National Malleable & Steel Castings Co., is retiring Dec. 31 after nearly 54 years with the company.

NEW NCC MEMBER: Alloy Casting Institute has become a member of the National Castings Council. It will be represented on the council by Harvey T. Harrison, the Duraloy Co., Scottdale, Pa., and B. J. Gross, the Key Co., St. Louis. Ten organizations of the foundry industry now comprise the council's membership.

SKILLED MEN NEEDED: Emphasizing the need for expansion of apprentice training programs is the current scarcity of skilled workers in various crafts. U. S. Department of Labor reports that its state employment service offices in September had nearly 20,000 openings for craftsmen they were unable to fill. These included 8575 skilled machine shop workers, 2241 molders, pattern-makers and model makers, 1290 aircraft mechanics, and 1060 electricians, linemen and servicemen.

ACQUIRES DIE CASTER: National Lead Co. will acquire the Doehler-Jarvis Corp. under a plan subject to final approval by the latter's stockholders. Doehler-Jarvis, a leading producer of die castings, operates plants at Batavia, N. Y., Chicago, Grand Rapids, Mich., Pottstown, Pa., and Toledo, O. The business will be operated as a division of National Lead.

COKE PRICES UP: Oven foundry coke is more expensive. Reflecting the recent price boost granted coal mines, coke quotations have been advanced $1.25 to $1.50 a ton at most oven centers.

MAGNET FOUNDRY: Carboloy Department of General Electric Co. expects to complete by next fall a new foundry at Edmore, Mich., for the casting of Alnico magnets. The magnets now are being produced at Schenectady, N. Y. It is said the new facility will be one of the country's most modern foundries.

PRICES OF FOUNDRY METALS AND COKE

(As of Dec. 23, 1952)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$16.50-17.50
New River	20.80
Wise County	15.95

OVEN

Birmingham	$21.65
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	26.05
Indianapolis	24.25
Kearney, N. J.	24.00
Milwaukee	25.25
Painesville, O.	25.50
Philadelphia	23.95
Portsmouth, O.	24.00
St. Louis	26.00
Swedeland, Pa.	23.85
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$57.00	$57.50
Birmingham	51.38	....
Buffalo	55.00	55.50
Chicago	55.00	55.00
Cleveland	55.00	55.00
Everett, Mass.	59.25	59.75
Fontana, Calif.	61.00	....
Geneva, Utah	55.00	....
Granite City, Ill.	56.90	57.40
Lone Star, Tex.	51.00	51.00
Neville Island (Pittsburgh)	55.00	55.00
Steelton, Pa.	57.00	57.50
Swedeland, Pa.	59.00	59.50
Toledo, O.	55.00	55.00
Troy, N. Y.	57.00	57.50
Youngstown, O.	55.00	55.00

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5—27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c.

ALUMINUM: 99 per cent plus, primary ingots 20.00c. Secondary No. 12 alloy 19.50c. Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytice 24.50c, Connecticut valley; Lake 24.62½c, delivered.

ZINC: High grade 13.85c, delivered. Die casting alloy 17.00c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

Above delivered prices are ceiling levels at basing points indicated. * Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.

WESTINGHOUSE • PRIER BRASS MFG. CO. • READING GRAY IRON CASTINGS, INC.
McNALLY-PITTSBURG • RIVERSIDE FOUNDRY CO. • BLUE VALLEY FOUNDRY CO.
E. L. LeBARON FOUNDRY CO. • STANDARD FOUNDRY CO. • HARTFORD ELECTRIC STEEL CORP.
BULLARD CO. • WELLMAN BRONZE • COOPER ALLOY • TEXAS ELECTRIC STEEL

Two Good Reasons Why These and Many Other Famous Foundries have switched to

BS&B FOUNDRY FLASKS

1 The way they're made

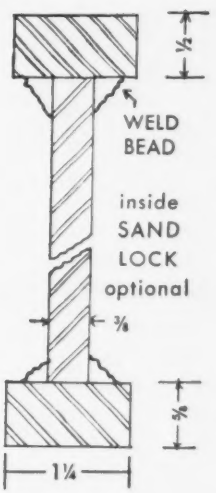
BS&B Foundry Flasks are designed by men with actual foundry experience. They know from experience the features you want! From their designs, BS&B's skilled workmen can turn out a flask tailor made for you. Your BS&B Flask will have the greatest rigidity, with minimum weight for easy handling. BS&B Flasks are constructed entirely of steel . . . all parts joined together with electric arc welding . . . sections are surface ground or machined, top and bottom, to insure a tight joint at the parting line . . . pinholes fitted with removable hardened steel bushings—round and oblong. Pinlug arrangements to your individual requirements.

2 The way they stand up

Pennies make you dollars where BS&B Foundry Flasks are concerned. Maybe you do pay a little more for BS&B Flasks . . . but you get dollars of extra value. BS&B Flasks require a minimum of maintenance year in and year out. They stand up—turn out better casings, keep scrap down. Actually, BS&B customers report six-eight-ten even twelve years of operation—without maintenance expense! Here's proof BS&B Foundry Flasks are built to stand continued use under hard working conditions and vigorous shake out. Cost records maintained by many foundries prove BS&B Foundry Flasks withstand more castings per flask throughout their service life.

Have a really tough, heavy casting job to do? Then put this one into service

BS&B Heavy Duty Flask Style FP 22



The only flask made combining these three features: (1) Welding of bearing strips, both inside and out; (2) Cast steel trunnions; (3) Cast steel pinlugs and clamplugs. Reinforcing rib is optional. Design and method of fabrication eliminates corner cracking and breaking out.

Write for FREE BS&B Foundry Flask Handbook
a handy catalog and useful foundryman's "bible"
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FOUNDRY OUR 60TH YEAR BS&B FLASKS

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43 Years of PROGRESS...

An Early Demmler Core Blower

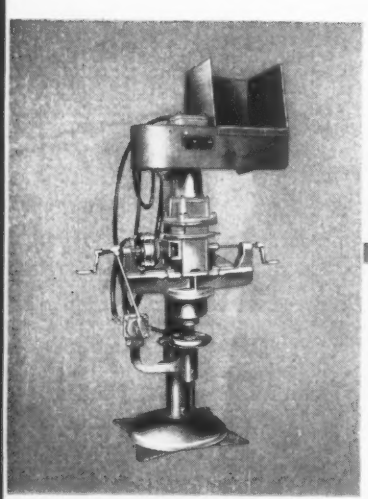
The picture at the right, taken in 1909, shows one of the first Demmler core blowers. Some of these "old reliables" are still in use today — holding their own against modern core blowers. This machine had a line shaft driven carriage using compressed air for blow and clamp. In 1921, "old reliables" were discontinued in favor of the more modern all air operated machines.

We think "old reliable" perfectly illustrates the famous Demmler quality, for only quality design and construction can make possible so many years of reliable service. Original pioneer of the core blower industry, Wm. Demmler & Bros. is still the acknowledged leader in the field.

Today, as in the "good ol' days", the name Demmler stands for quality and service. When you need information about core blowers, core boxes, vents, vented plates, etc., call on Demmler, the leader in the field. This service is yours without obligation.

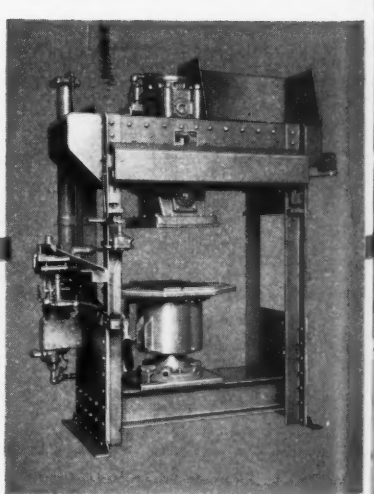
DEMMLER CORE BLOWERS FOR 43 YEARS

1909



MODEL NO. 55 — One hand valve operates both vertical and horizontal core box clamps. Capacity for cores up to 5 pounds. Fast economical production on short run jobs.

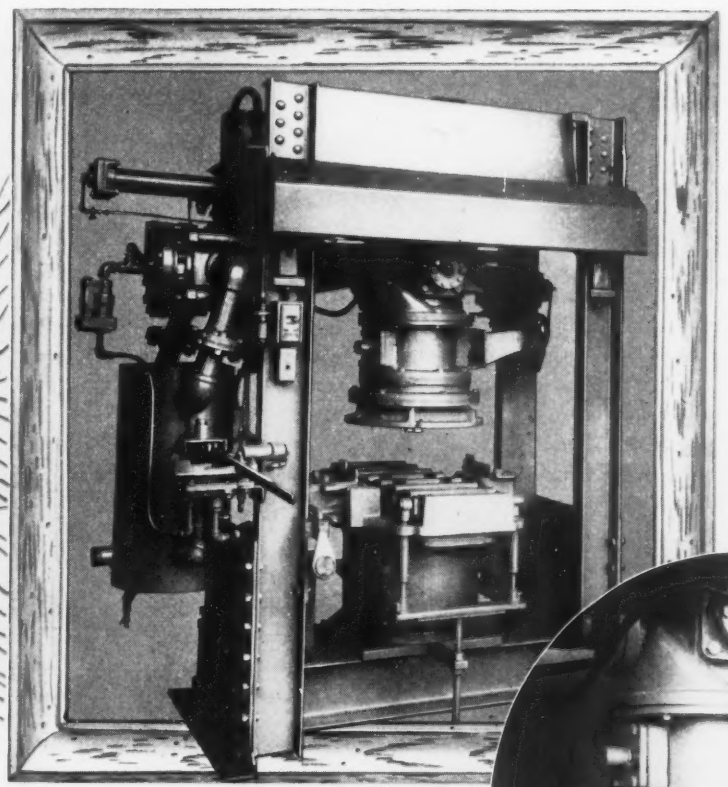
MODEL NO. 1E — Draw cylinder 11" diameter, 8" stroke. Throat opening in carriage 5" diameter. Blows cores up to 8 pounds. Designed for high production, low cost.



MODEL NO. 2E — Draw cylinder 14" diameter, 10" stroke. Throat opening in carriage 7" diameter. Capacity for cores up to 20 pounds weight. Each feature is a profit feature.

TO BRING YOU OUR

Latest Core Blower

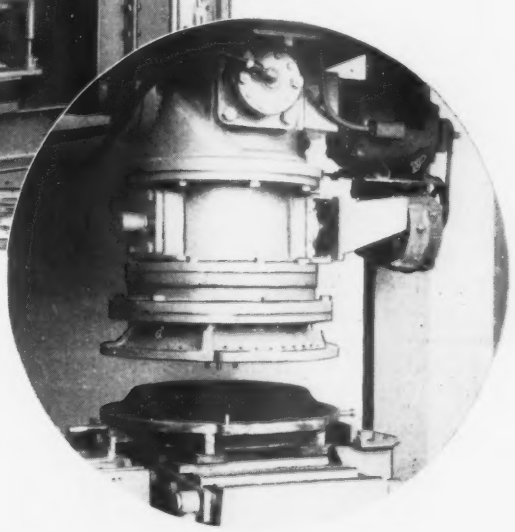


The LATEST Demmler Core Blower

We are proud to present the 103, our latest model combining all the valuable experience we have gained in 43 years of core blower manufacturing.

The 103 is a stationary magazine type core blower, capable of blowing ANY core or molding sand. It is fast, hard blowing and extremely efficient. All air-operated, the 103 is carefully designed to minimize maintenance.

This new blower is available in two sizes. The 103 handles cores up to 50 pounds. A larger model, called the 104, is designed to handle cores up to 250 pounds. Both models have either hand or automatic operation, six second maximum cycle. Absolutely the latest and best in core blowers.

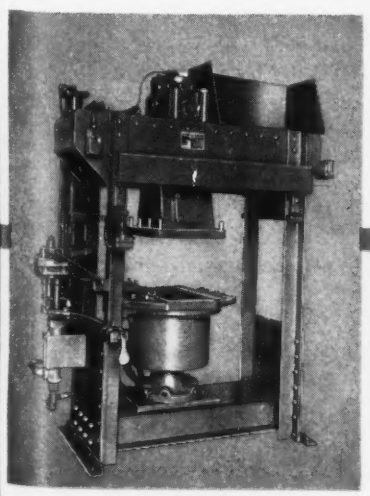


1953

Sand Agitator Available

A motor driven sand agitator is available as an accessory when blowing extremely heavy sands. Thoroughly tested, this agitator has been in use on Demmler Core Blowers for years.

The core shown on the table of the machine in the inset is blown of molding sand. This core blower is guaranteed to blow ANY molding sand or core sand required in the foundry!



MODEL NO. 3E — Draw cylinder 17" diameter, 10" stroke. Throat opening in carriage 10" diameter. For blowing cores up to 35 pounds in weight. Built with Demmler quality.

WM. DEMMLER & BROS.

KEWANEE, ILLINOIS

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

COLUMBIUM and TANTALUM

Strategic Combination for Imparting Strength and Stability to High-Temperature Metals

Gas turbines for jet-aircraft engines, and for other similar engines being developed for marine and railway transportation, have greatly increased the demand for high-temperature metals. The present most satisfactory metals are either iron-base, nickel-base, or cobalt-base. They are used in the form of castings and hot-worked products, such as forgings, bars, and sheets.

Many of these special metals contain columbium because of its beneficial effect on high-temperature strength in both cast and wrought products. Investigations have shown that columbium is one of the key alloys for imparting high-temperature strength and stability in metals suitable for operating temperatures up to 1500 deg. F. and above.

Need for New Alloy

Originally, a ferrocolumbium alloy containing approximately 55 per cent columbium and 5 per cent tantalum was employed in the production of many of these high-temperature metals. However, with the increased use of high-temperature metals and columbium-bearing 18-8 stainless steels, the demand for columbium exceeded its availability.

ELECTROMET's Research Laboratories began investigations to ascertain whether an alloy containing more tantalum and less columbium would be equally satisfactory for producing the high-temperature metals. Columbium and tantalum alone, as well as combination alloys of columbium plus tantalum, were tested.

Results of Tests

The alloy N-155 was selected for tests. It is an iron-base alloy with the following approximate analysis:

Chromium	20 per cent
Nickel	20 per cent
Cobalt	20 per cent
Tungsten	3 per cent
Molybdenum	2 per cent
Columbium	1 per cent
Nitrogen	0.15 per cent
Carbon	max. 0.35 per cent

The data in the table below describe the mechanical properties, at room temperature, of this low-carbon N-155 alloy modified with columbium and tantalum alone, and with combinations of columbium plus tantalum. The metal modified with columbium has good strength and high ductility at room temperature. These same good properties are obtained when tantalum, or tantalum plus columbium, is substituted for the columbium.

Stress-to-rupture tests were also conducted on these same modified low-carbon N-155 alloys at 1350 and 1500 deg. F. The data show (see table) that when the columbium is replaced with a mixture of columbium plus tantalum, the strength of the metal remains substantially unaffected at 1350 and 1500 deg. F. Also, when all of the columbium is replaced with tantalum, the strength of the metal at 1500 deg. F. is equivalent to that obtained with columbium. Hence, from the standpoint of high-temperature strength, columbium and tantalum can be used interchangeably, or in combination.

Properties of Modified N-155 Alloys Compared*

Typical Analysis, %**	With Columbium	With Columbium and Tantalum		With Tantalum
Columbium	1.13	0.58	0.49	....
Tantalum	0.08	0.64	0.53	1.47
Carbon	0.12	0.13	0.13	0.12
Nitrogen	0.13	0.14	0.14	0.14
At Room Temperature				
Tensile Strength, psi	119,000	123,200	117,500	122,100
Yield Strength, psi	56,700	59,500	52,000	59,100
Elongation in 2 in., %	52	47	57	54
Reduction of Area, %	69	65	69	56
At 1350 deg. F.				
Stress to Cause Rupture, psi				
In 100 hr.	31,000	34,000	33,500	....
In 1000 hr.	23,000	25,000	23,000	....
At 1500 deg. F.				
Stress to Cause Rupture, psi				
In 100 hr	20,000	20,000	20,500	20,000
In 1000 hr.	15,000	14,000	15,500	15,000

* Tests made on standard samples from one-inch round bars, water-quenched from 2250 deg. Fahrenheit.
** Composition of the base alloy is given in the text.

Help to Industry

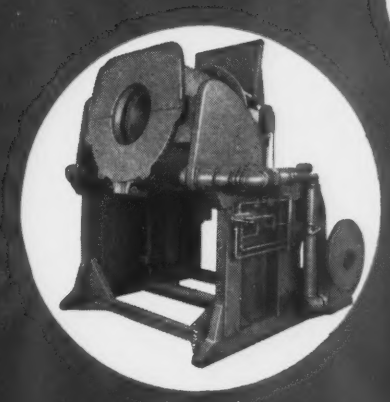
ELECTROMET has developed an alloy containing approximately 20 per cent tantalum and 40 per cent columbium for use in high-temperature metals and stainless steels. It is known as ELECTROMET ferrotantalum-columbium.

Industrial experience with this comparatively new alloy has confirmed the favorable results of the experimental work. The alloy has already aided considerably in augmenting the supply of columbium alloys, since it is just as effective as ELECTROMET ferrocolumbium, with 50 to 60 per cent columbium, for giving strength at high temperatures.

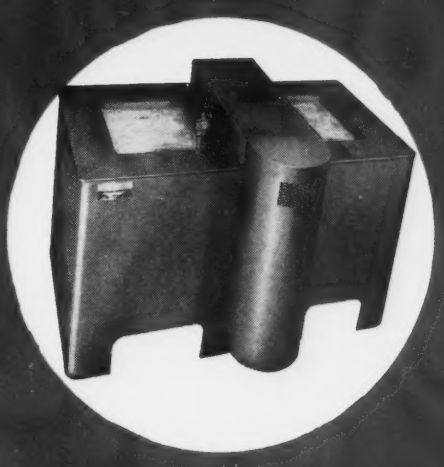
Furthermore, the new alloy is now preferred because of its greater availability. It should be added to a thoroughly deoxidized metal bath to obtain the best results. A recovery of about 90 per cent for the columbium and 80 per cent for the tantalum may be expected.

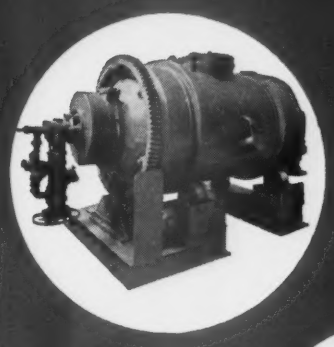
For further information regarding alloys for high-temperature metals, write to the nearest ELECTROMET office: in Birmingham, Chicago, Cleveland, Detroit, Houston, Los Angeles, New York, Pittsburgh, or San Francisco. In Canada: Welland, Ontario.

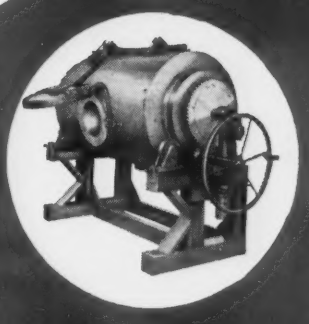
The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.



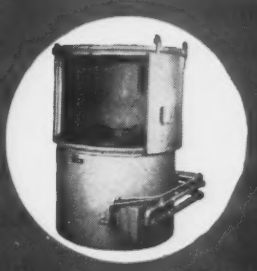
MELTING AND HOLDING FURNACES







Lindberg-Fisher builds all kinds of melting and holding equipment . . . gas . . . oil . . . electric . . . induction . . . arc and high frequency. Lindberg-Fisher engineers can intelligently and without prejudice recommend the proper type of furnace to best suit your needs and conditions.



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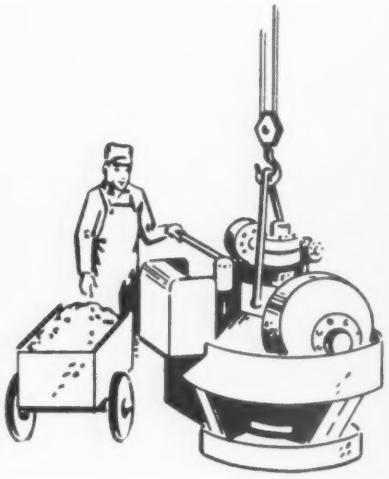
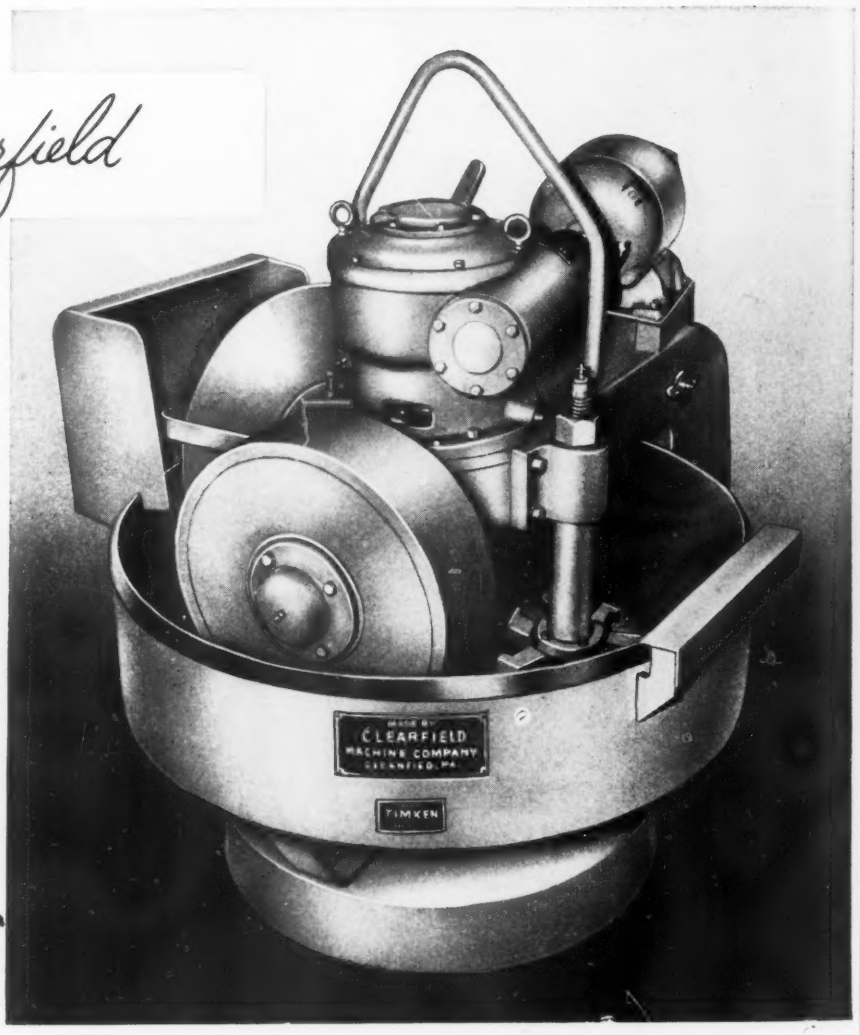
for *Portability*

THE *Clearfield*

No. 414





This 414 Clearfield Mixer has a wide field of use in either large or small plants in which the plan of sand preparation is built around the portability of the mixing unit. It may be suspended from a crane or monorail hoist and may be thus carried over the entire molding floor eliminating the need for conveying equipment. The machine is perfectly balanced and may be loaded, operated and discharged while suspended above the floor. Where crane facilities are not available for this purpose, the mixer may be equipped with roller bearing casters by means of which it may be moved anywhere over a level floor. The 414 delivers four cubic feet per batch.

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TOCCO* Induction Melting Furnaces for Precision Casting

One of the TOCCO Induction Melting Furnaces used at Arwood Precision Casting Co. Note TOCCO control station in background.

● Engineers at Arwood Precision Casting Co. use TOCCO Induction Melting Furnaces for melting and remelting quality steel. Other companies have found TOCCO equally adaptable for melting non-ferrous metals. No wonder! *Look at the advantages:*

- ★ Stepless power control
- ★ Extremely Rapid Melting
- ★ High Efficiency on Intermittent Operation
- ★ Good Mixing because of Natural Agitation
- ★ Extremely Low Alloy Loss
- ★ No Carbon Pick-up
- ★ No Contamination when Composition of Charges is Changed
- ★ High Reproducibility of Results
- ★ Minimum Space Requirements
- ★ No Special Installation Charge
- ★ Simple, Safe Operation
- ★ Clean, Comfortable Working Conditions

If any of these advantages suggest economies in your operations write for full details—no obligation, of course.

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Please send copy of "The Case for TOCCO Induction Melting."

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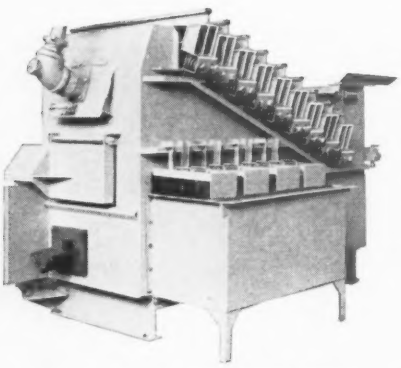
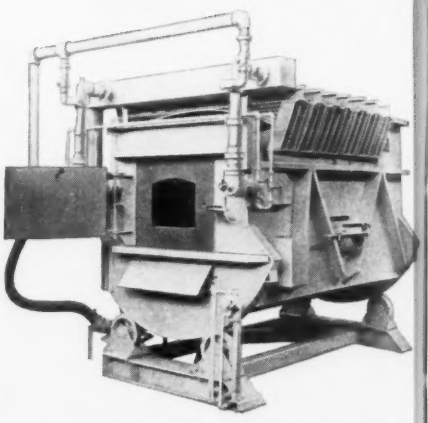
ALUMINUM

These Stroman Built Furnaces are designed for production of unsurpassed quality metal in the fastest, most efficient and economical manner. Built for all purposes and capacities they meet the demands of the sand foundries, die casters, permanent mold plants and smelters. They are recognized as the finest in the industry and reduce costs and make working conditions most agreeable. All furnaces may be fired by oil or gas.



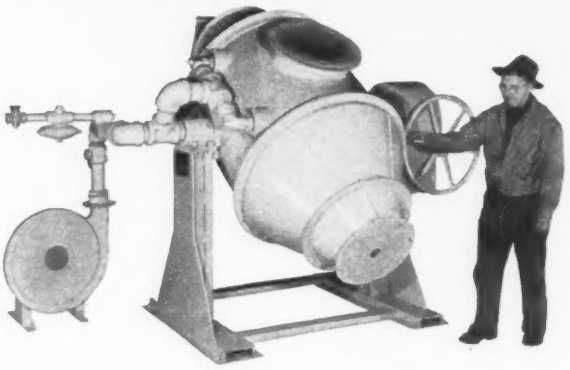
MODEL "MC" DIP-OUT TYPE

For melting and holding all in the same furnace. Hot metal always available. No iron pots or crucibles to replace. Capacities from 500 to 5000 pounds aluminum.



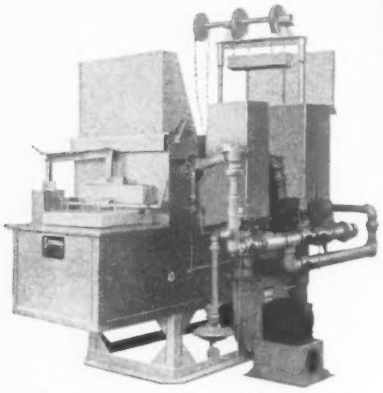
MODEL "SW"—TILTING TYPE

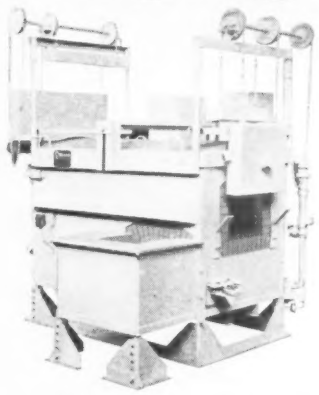
Excellent to run back returns along with ingot required for permanent mold, die or sand casting operations. Also an ideal breakdown furnace. Capacities—600-1000-1700-3000 lbs. Aluminum.



MODEL "BFC"

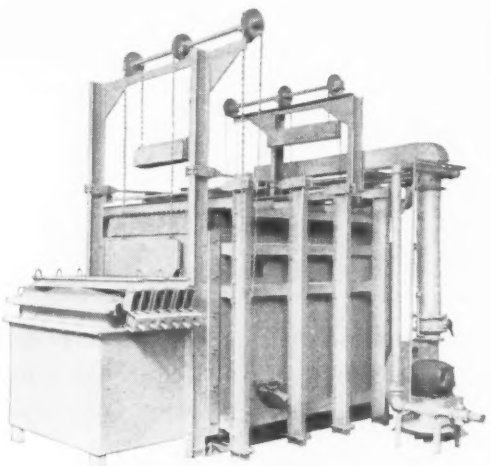
Hand tilt, open flame, barrel type furnace with flames firing tangent to inside of lining. Very fast melting. Used in all type plants including smelters. Capacities—500 lbs. Aluminum. A must for all aluminum jobbing sand foundries.





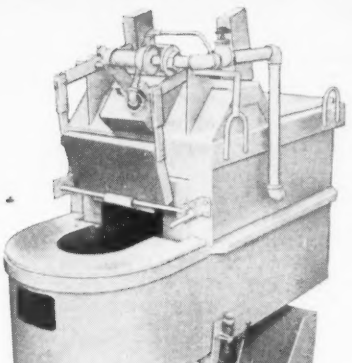
MODEL "DC" FURNACE

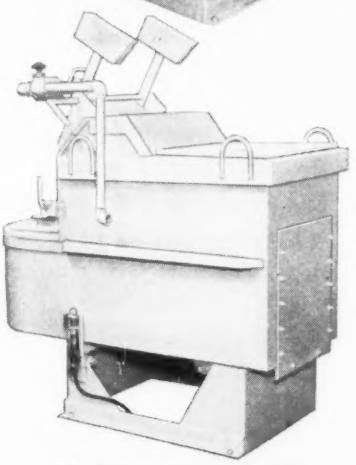
The 2 in 1 furnace. Breakdown and Holding in the same unit. Cold metal never reaches the molten bath. Assures metal of the finest quality on all classes of work. Close temperature control. Can be used as a sweat furnace for reclaiming inserts. Ideal for all types of plants including sand, permanent mold and die casting. Capacities from 350 lbs. Aluminum up.



SMELTERS FURNACE

Built especially for smelters and other large melters. Easy charging, drossing, fluxing and alloying. Can be built to your own specifications. Capacities from 3000 lbs. Aluminum up.





MODEL "DSC" DIE CASTING FURNACE

A small reverberatory furnace for melting and holding, or for holding only when hot charged at the die casting machine. Made in various sizes to meet your requirements.

STROMAN ALSO BUILDS FURNACES FOR THE MELTING OF BRASS, BRONZE, MAGNESIUM, IRON, ETC., ALSO CORE OVENS. WRITE TODAY FOR NEW CATALOGUE NO. 800.

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Desand-degraphitize castings in 10 minutes with VIRGO® MOLTEN CLEANER

UNLOADING VIRGO-CLEANED CASTINGS from continuous cleaning line.

HERE ARE THE BENEFITS!

- **Longer machine tool life.**
- **All surface defects show up.**
- **A cleaner, better product.**

With Virgo Molten Cleaner your castings are completely free from sand and graphite before they are machined, giving you greater machine tool life. Any surface defects on castings are shown up, and you can scrap defective castings before they are machined. This same freedom from impurities insures trouble-free operation for your product when it is placed in use.

The process is simple and easy to operate—does not require close supervision. A five-minute immersion of castings in Virgo Molten Cleaner bath at 800° F. is usually enough to dissolve every trace of sand, and dissolve graphite to satisfactory depth. A water quench removes salt and leaves a protective coating on the castings. (This coating is corrosion-resistant and may be left on if castings are to be stored.) The coating is removed by a three-minute dip in dilute acid. A brief water hosing or rinse completes the job.

You can use the Virgo bath, at higher temperature, to stress relieve while desanding. By combining operations in this way, costly annealing equipment, as well as the additional operation can be eliminated.

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Producers and fabricators of stainless and alloy steels use Virgo Descaling Salt to quickly remove scale produced by hot rolling, forging, extruding, casting, annealing. The Hooker Process is backed by 15 years' experience in salt bath descaling and cleaning. Engineering, research and on-site operating assistance are part of our service.

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They tell the whole story on Virgo Descaling Salt and Virgo Molten Cleaner—what they are, how they work, their advantages, equipment involved, and the Hooker services you enjoy as a user of the process.

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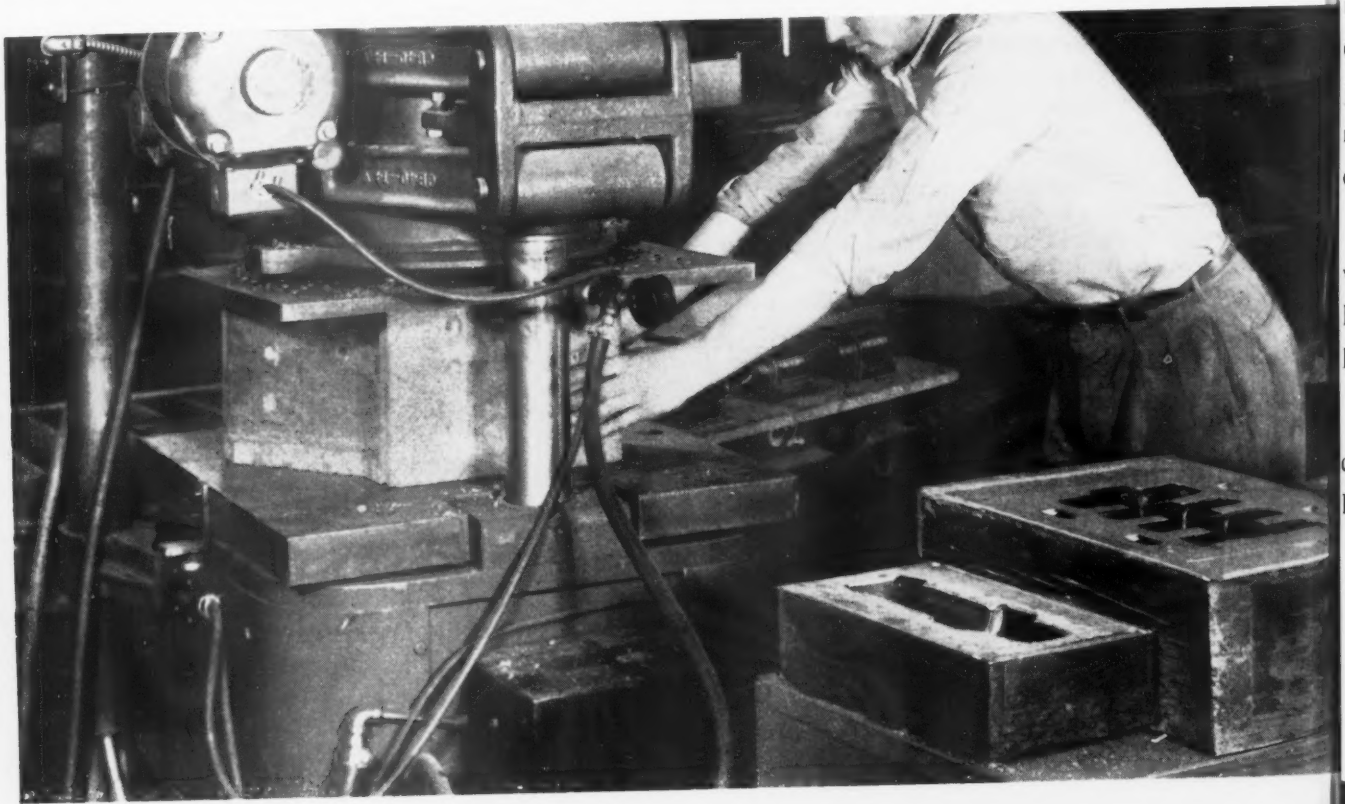
1-1949

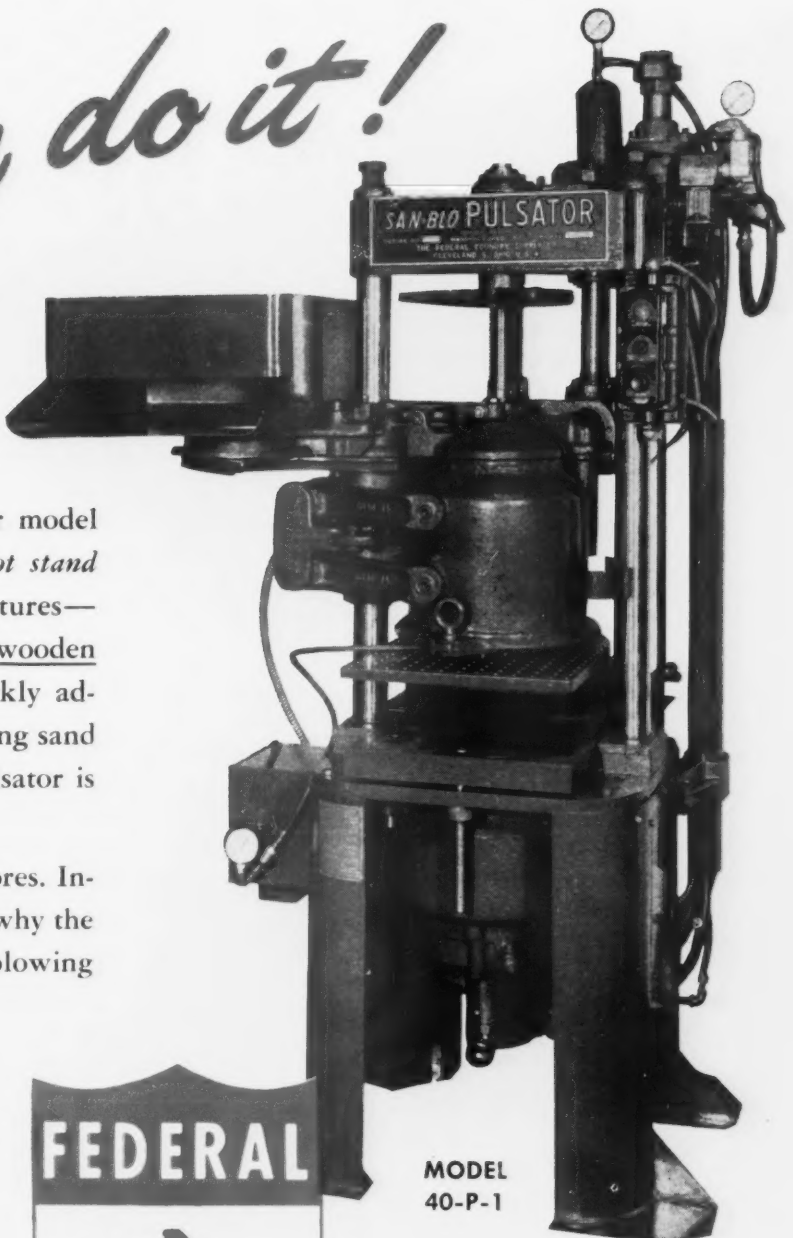
It costs you money to make cores by hand



when a machine could be blowing them, and

.....here's *the* core blower

that can do it!



There are no *handcuffs* on the Pulsator model SAN-BLO! It's built to blow cores—*not stand idle!* It will blow all your core sand mixtures—not just some of them. It will blow your wooden core boxes—not just metal boxes. Quickly adjusted to core boxes. No time lost changing sand magazines or blow plates. And—the Pulsator is easy, safe and clean to operate.

So, don't ever think you can't blow cores. Investigate this new core blower and learn why the Pulsator does away with the many core blowing limitations you've been used to.

Remember, to turn core *making* into core *production*—it's the SAN-BLO Pulsator—the *all-purpose* core blower.

For complete information, write for Catalog P-1.

FEDERAL

MODEL 40-P-1

. . . for cores weighing up to 40 lbs. each—for metal and wood boxes—6" draw table standard equipment. Other models available for cores weighing up to 250 lbs. —choice of automatic controls.

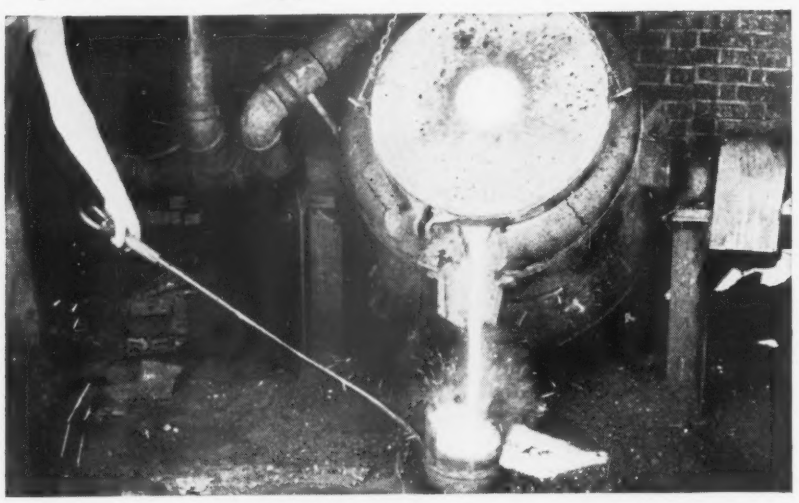
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The **FEDERAL FOUNDRY SUPPLY** *Company*

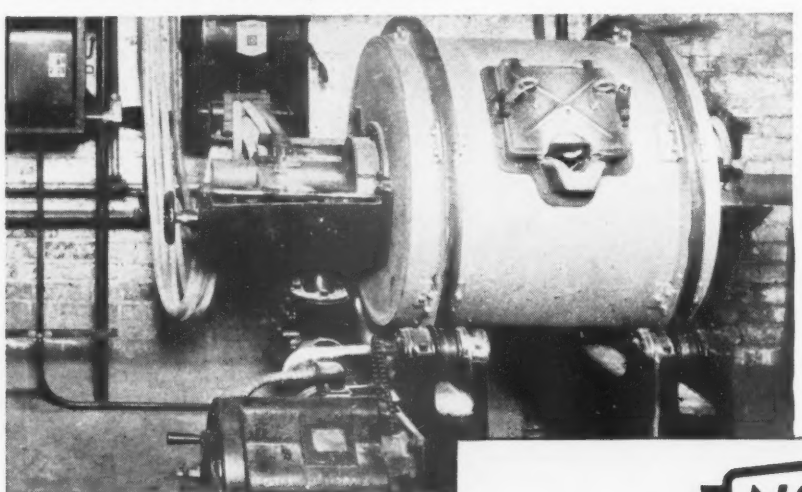
4600 EAST 71st STREET, CLEVELAND 5, OHIO

SALES OFFICES: NEW YORK · CLEVELAND · DETROIT · MILWAUKEE · LOS ANGELES

THIS REVERBERATORY FURNACE is lined with a Norton CRYSTOLON* refractory cement, engineered to last longer on this particular metal-melting job.



THIS TILTING CRUCIBLE FURNACE has a cover and lining made of a Norton CRYSTOLON refractory cement. It was engineered to fit this firm's individual requirements.



THIS INDIRECT ARC FURNACE owes much of its high output to its lining, made of a custom-engineered Norton ALUNDUM* refractory cement.

Melt more metal per furnace-hour

with refractory linings engineered for you

Every time you interrupt your metal-melting campaigns to patch or replace your furnace linings, you lose production you never get back.

That's why just *any* refractory cement won't do. You want the *one* cement that fits your requirements so exactly that it reduces interruptions to a minimum. Chances are, the one just-right cement hasn't been made yet.

That's where your nearby Norton refractories engineer enters your picture. He's ready to call on Norton Research . . . pioneers for 40 years in the development of special refractories for complicated high-temperature requirements.

Working together, you and Norton Company are sure to arrive at the one CRYSTOLON, ALUNDUM, MAGNORITE* or FUSED STABILIZED ZIRCONIA refractory cement that fits your exact requirements.

For more information about this special Norton service, call your nearby Norton refractories engineer, or write Norton Company, 300 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

*Trade-Marks Reg. U. S. Patent Office and Foreign Countries

NORTON

Special REFRACTORIES

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

1 UNLOAD SAND FROM BOX CARS
2 CARRY COAL TO PULVERIZERS
3 WINDROW SAND FOR CUTTER
4 ADD NEW SAND TO OLD
5 REMOVE CUT SAND FROM FLOOR
6 DELIVER SAND TO MOLDERS
7 DELIVER CORE SAND TO CORE DEPARTMENT
8 CHARGE MULLERS
9 CARRY NEW SAND TO STORAGE
10 CHARGE HOPPERS
11 HANDLE ASHES
12 CARRY OUT SLAG
13 HANDLE SCRAP AND SMALL CASTINGS
14 CLEAR DRIVES AND YARD OF SNOW
15 HAUL AND PUSH
16 DO CRANE WORK
17 MISCELLANEOUS HANDLING JOBS

PAYLOADERS at Peoria Malleable PAY OFF 17 WAYS

Peoria Malleable Castings Co. believes in mending the roof *before* it rains. Although operations were profitable, they decided to mechanize more completely to improve their productive capacity and to lower costs. Their first step was to purchase "PAYLOADER" tractor shovels to eliminate hard, manual material handling jobs. Examples of the many benefits "PAYLOADERS" accomplished for them are:

(1) 21 manhours of labor saved unloading each box car of sand

(2) cut costs 30% in the night shift on mold dump and clean up. "PAYLOADERS" deliver all sand to a central muller, deliver all sand to molding stations, deliver 65-70 loads of coal per day from outside stockpile to two pulverizers . . . do many other material-handling and other chores faster and cheaper.

If you want to know how these fast, maneuverable machines can save time, labor and costs in *your* foundry, call in your PAYLOADER Distributor, or write The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

SAY "HUFF"

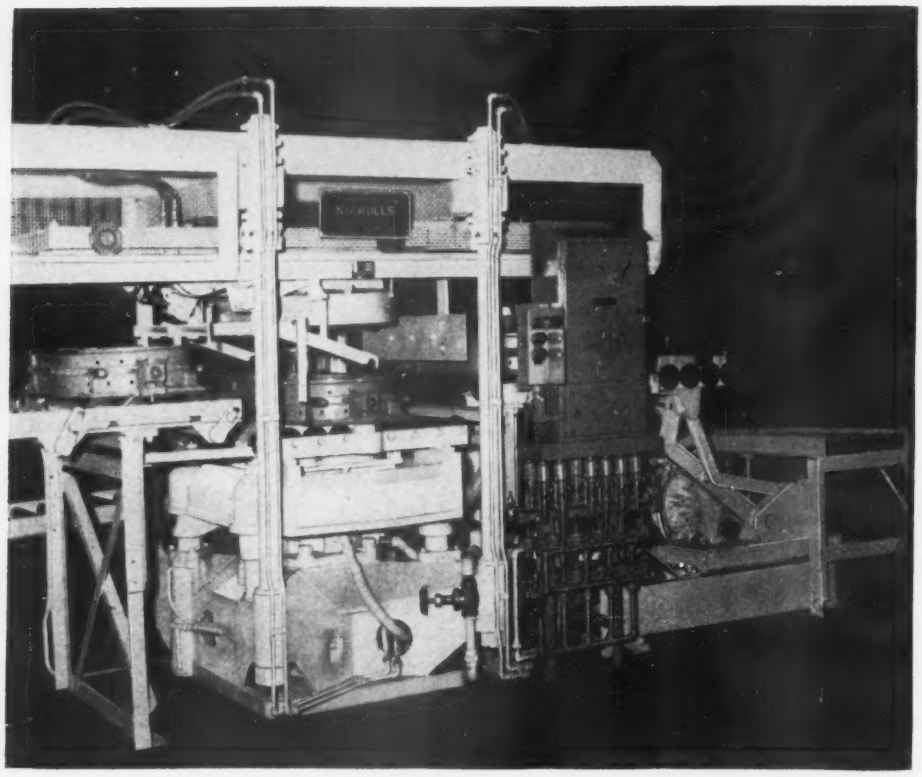
PAYLOADER®

THE FRANK G. HOUGH CO. · Since 1920

ALL THE FACTS—

FREE

The full report, with pictures of "PAYLOADER" use at Peoria Malleable is contained in INDUSTRAIL HANDLING Magazine, Vol. 2, No. 1. Write for your copy.



No. 21 Type C. F.—Jolt, Squeeze and Pattern Draw — Automatic-Push Button Control

(Also Made in Smaller and Larger Sizes)

New "Push-Button" Operation Takes The Guesswork Out of Molding

From start to finished mold, the Nicholls #21 Type CF Jolt, Squeeze and Pattern Draw Molding Machine is push-button controlled to eliminate dangerous risks, costly mistakes—to give you better molds *continuously*. Precision built for long years of service . . . made with all the safety-devices, the hidden "quality points" that reduce maintenance costs . . . the know-how that almost half a century of building quality molding machines has made possible. If you're interested in better quality molds at lower cost—investigate these machines now.

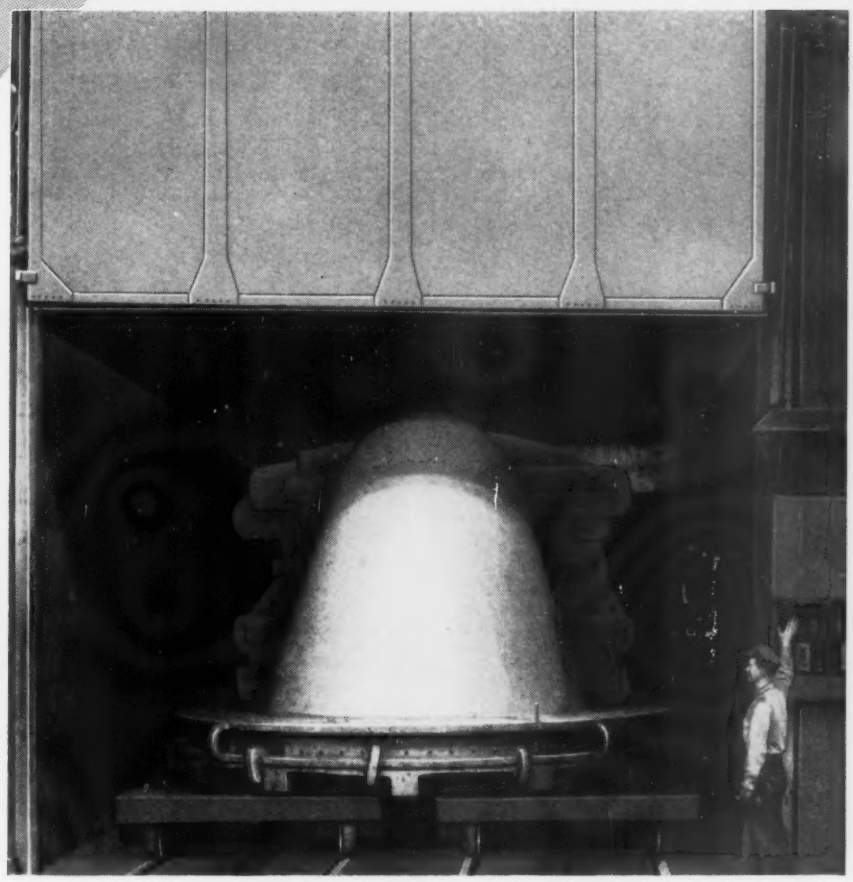
For complete information, write to:

William H. Nicholls Co., Inc.

Richmond Hill 18, Long Island, New York

NICHOLLS

Another LARGE MOLD OVEN *installation by* CARL-MAYER



One of two Car Type Mold Drying Ovens at Pittsburgh Steel Foundry Corporation.

Size (each oven): 32′-0″ deep x 18′-0″ wide x 15′-0″ high.

Individual gas and oil fired recirculating heating system. Heating arrangement provides for uniform temperature control, eliminates side wall ducts which might become damaged by shifting loads within the oven, and provides larger clearances.

Oven load capacity: 100 tons per charge.

• • •

CARL-MAYER

products include:

VERTICAL CORE OVENS

•

HORIZONTAL CONVEYOR CORE OVENS

•

RACK TYPE CORE OVENS

•

ROLLING DRAWER CORE OVENS

•

OVENS AND FURNACES FOR OTHER PURPOSES.

So much depends on the right selection of this type of oven equipment, that buyers check and double check—and compare engineering features critically before placing order.

Therefore, the choice of Carl-Mayer Ovens is a real endorsement of their all around leadership.

It will pay you to make consultation with Carl-Mayer engineers a MUST when on the market for foundry ovens. Write for New Bulletin No. 53-CM.

• • •

Carl-Mayer ovens are serving concerns like these:

Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.

Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.

Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
Crucible Steel Castings Co.

Dunkirk Radiator Co.

Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.

Ford Motor Co.
Fremont Foundry Co.

G. & C. Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.

Henry Kaiser Corp.

W. O. Larson Foundry Co.

Mesta Machine Co.
F. E. Meyers & Bro. Co.

Oil Well Supply Co. (U. S. Steel Corp.)

Packard Motor Car Co.,
Pittsburgh Steel Foundry Corp.

H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.

Union Brass & Metal Mfg. Co.
Union Steel Castings Co.

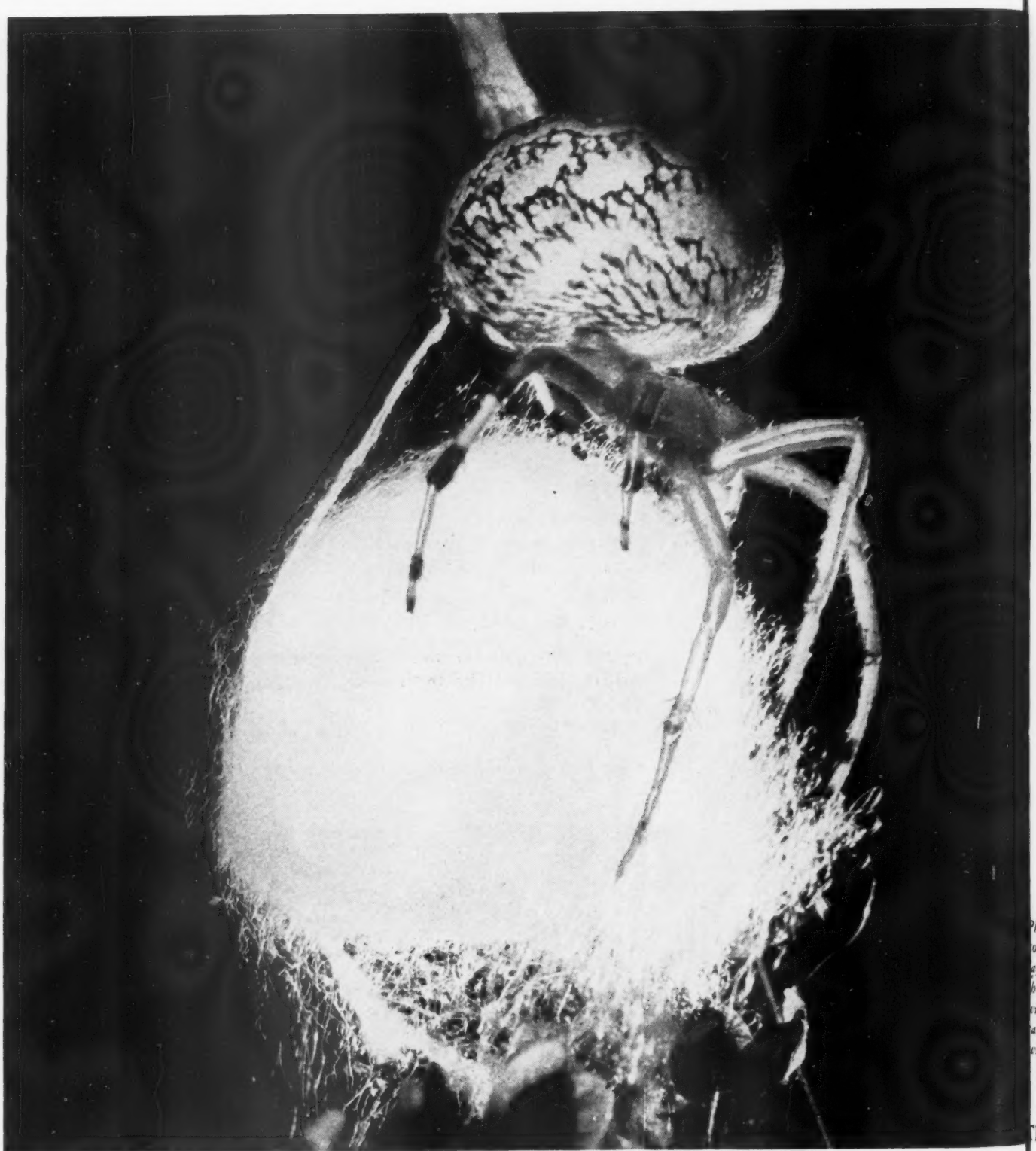
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

THE CARL-MAYER CORPORATION

3030 Euclid Avenue • Cleveland, Ohio

BACKED BY REPUTATION AND OVER 30 YEARS' EXPERIENCE

CRAFT



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The

TSMANSHIP

The Aranea, or Spider, is considered one of the most distinguished craftsmen in the animal kingdom. Its carefully-spun, silken webs and egg-cases are masterpieces of engineering and construction.

In their own field, HINES FLASKS, too, are masterpieces—products of similarly distinguished craftsmanship. For over thirty years, HINES has specialized in the production of foundry flasks and jackets, and has achieved the reputation for making the finest in the market. So, when you want the best, forget the rest—specify HINES!

HINES FLASKS

HINES POP-OFF FLASK

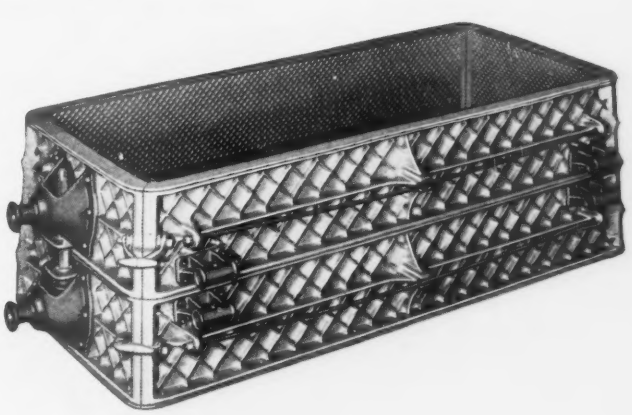
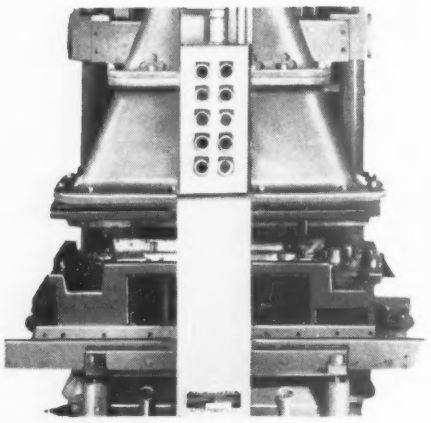


Photo-enlargement at left shows a female spider constructing her egg-case or cocoon. Layer upon layer of pure white silk is loosely woven about the hundreds of golden eggs. Later, the cocoon will be covered with a tough, parchment-like casing within which the newly-hatched young will be well-protected from the rigors of winter.

The Hines Flask Co., 3431 West 140th Street, Cleveland 11, Ohio • Telephone: ORchard 1-2806

Announcing the

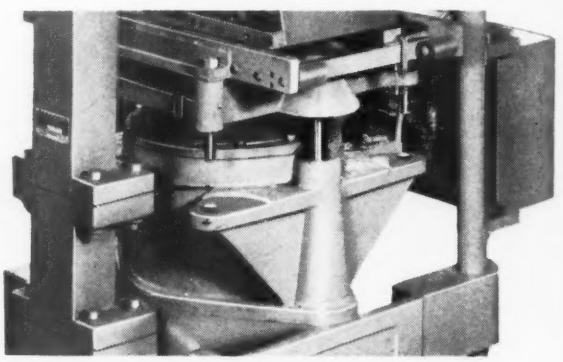


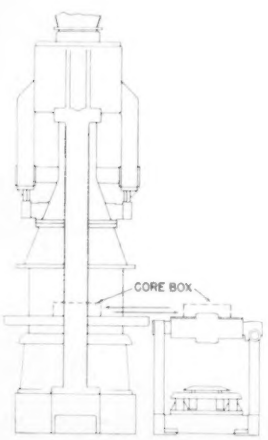
INCREASED CLEARANCE FOR OPERATOR

Note the unique three-point construction of the Sutter Core Blower which provides unobstructed access to both ends of the core box by the operator. While providing rigid support for the machine, this design feature eliminates corner columns which hinder the operator during transfer of the core box. Controls are also mounted on the center post for easy access.

POSITIVE ALIGNMENT

As explained on the facing page, the tilt-to-fill sand chamber returns to blow position against a positive stop for accurate alignment. In addition, the draw table travels up and down on hardened and ground pins and bushings which assure positive location of the top and bottom of the core box. The draw table is raised and lowered by a large squeeze piston which also provides counter pressure during the blowing operation.





COMPLETELY AUTOMATIC CORE PRODUCTION

***When used with the* SUTTER DOUBLE-ROLLOVER DRAW MACHINE**

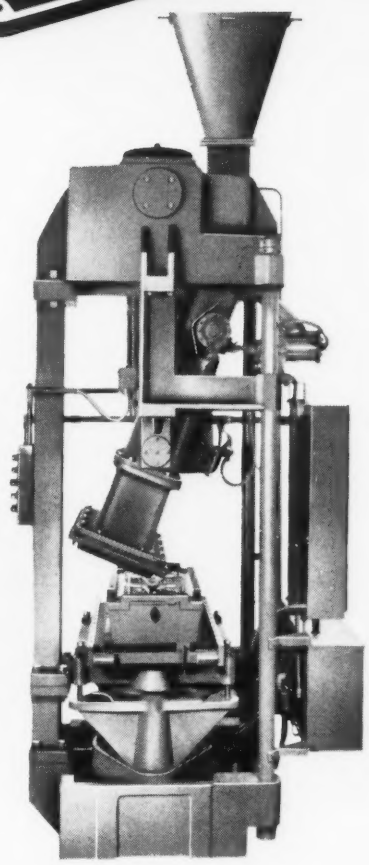
The Sutter Core Blower is designed for use with the famous Sutter Double-Rollover Machine and thus to provide completely automatic cycle. The core boxes are transferred automatically, and cores are blown and drawn automatically in this type of installation. The operator needs only to place the dryer on the core when it comes out of the blower and then remove the drawn cores from the draw table. Either right-hand or left-hand installations are practical.

SUTTER

SUTTER PRODUCTS CO.
2005 WESTWOOD AVE. • DEARBORN, MICH.

SUTTER CORE BLOWER

with the new TILT-TO-FILL SAND CHAMBER

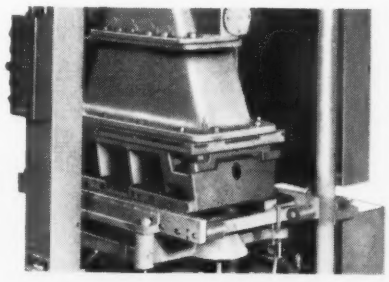


The new Sutter Core Blower embodies many important, exclusive features. Each has been developed to help produce better cores, produce them faster and more easily, and with fewer calls for maintenance and repair on the equipment.

The most outstanding of these features is the *tilt*-to-fill sand chamber. This completely new principle eliminates lateral transfer of the sand chamber for refill and all the tracks, wheels and springs needed for transfer. The entire sand chamber of the Sutter Blower pivots from blow to refill position on large anti-friction bearings. For refill, the chamber tilts backward to the hopper opening. When filled, it tilts forward to perpendicular position against a positive stop for accurate alignment with the core box. The entire assembly is simpler, has fewer parts, requires less maintenance.

Another feature of this new Sutter Blower is that the entire dome of the machine, over the sand chamber, constitutes a reservoir for compressed air. This provides an immediate release of compressed air when blowing a core and also compensates for fluctuations in line pressure.

Other important features are pointed up on the facing page. Throughout, this new Sutter Core Blower typifies the advanced thinking that is characteristic of all Sutter equipment. For complete details, write for data sheets on the Model SP-220 Core Blower.



In this view the sand chamber has tilted back into refill position. The draw table is in down position for unloading and reloading while the chamber refills.

In this view the sand chamber has returned to blow position and the table has raised to engage the core box.

SOLVE YOUR FOUNDRY PRODUCTION PROBLEMS WITH SUTTER SPECIAL FOUNDRY EQUIPMENT

Manufacturers of

SHELL MOLDING EQUIPMENT • COMBINATION CORE BLOWER AND DRAW MACHINES
SINGLE POWER-ROLLOVER AND POWER-DRAW MACHINES • AUTOMATIC WATER TESTING OF ROUGH CASTINGS • CORE ASSEMBLY AND SPECIAL FIXTURES

There is no substitute for Highest Quality

For your greater prosperity there are standard and custom made, uniform Macklin Grinding Wheels ready to give you cost saving results. They are made in any size, shape, grain or grade to meet your requirements and to "Protect Your Production." Ask for the services of a Macklin Field Engineer.

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS AND OTHER ABRASIVE PRODUCTS

JACKSON, MICHIGAN

MACKLIN GRINDING WHEELS

Sales Offices - Birmingham - Buffalo - Chicago - Cincinnati - Cleveland - Columbus - Detroit - Flint - Houston
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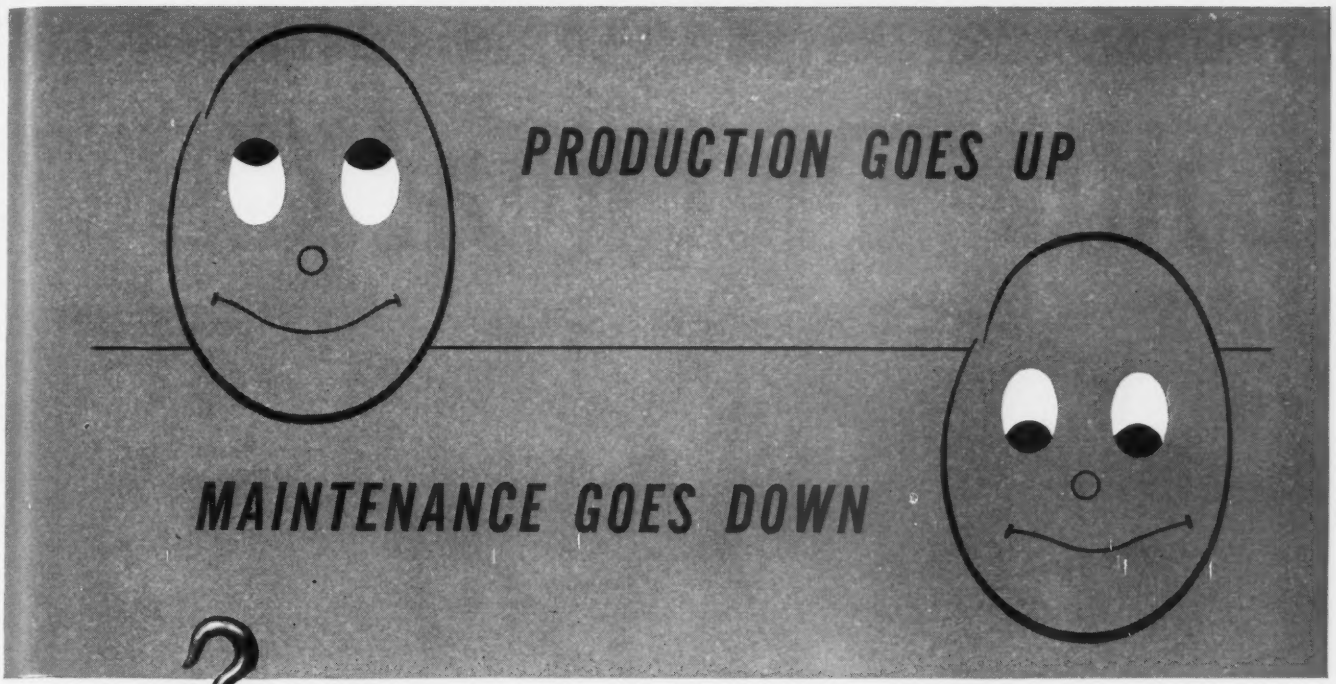
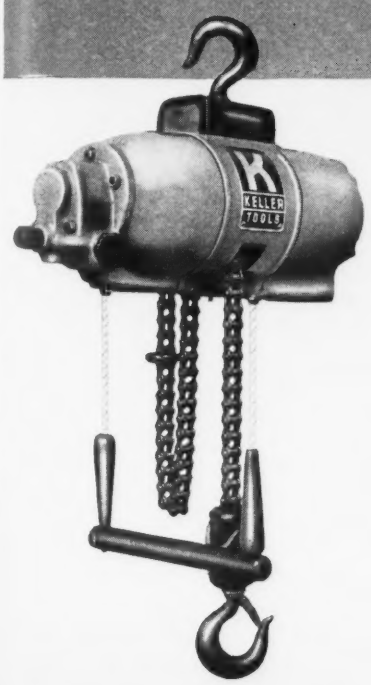




When you use

KELLER

Air Hoists *for foundry work*

Because Keller Hoists stand up to the rough, tough service that foundries demand. Maintenance is required but rarely. When it is needed, one man can easily climb a ladder and replace the hoist with a spare . . . with lost time counted in minutes instead of hours.

LIGHT WEIGHT
300- and 1,000-lb Hoists weigh only 30 lb; 1-ton model only 75 lb. Simple design and few moving parts make maintenance easy and inexpensive.

CONTROLLED SPEED
permits fragile loads to be handled with complete safety. Finger-tip control lets the operator "inch" loads up or down for accurate spotting.

CAN'T BURN OUT
from stalling, even if stalled all day! Nor is the air motor injured by dust or fumes. Keller Hoists stand up to the severest tests in foundry use.

Handling heavy castings in the cleaning room

KELLER TOOL CO., 4510 Race St., Grand Haven, Mich.

Please send me illustrated literature and prices of Keller Air Hoists.

Name_____

Title_____

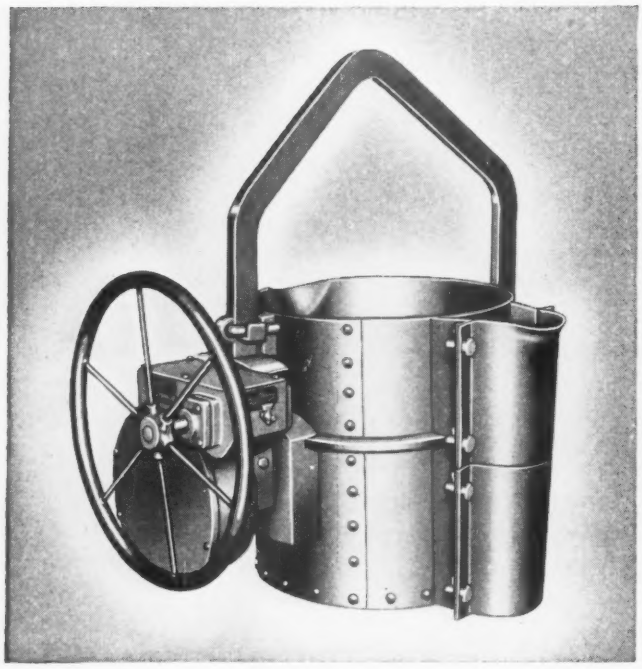
Company_____

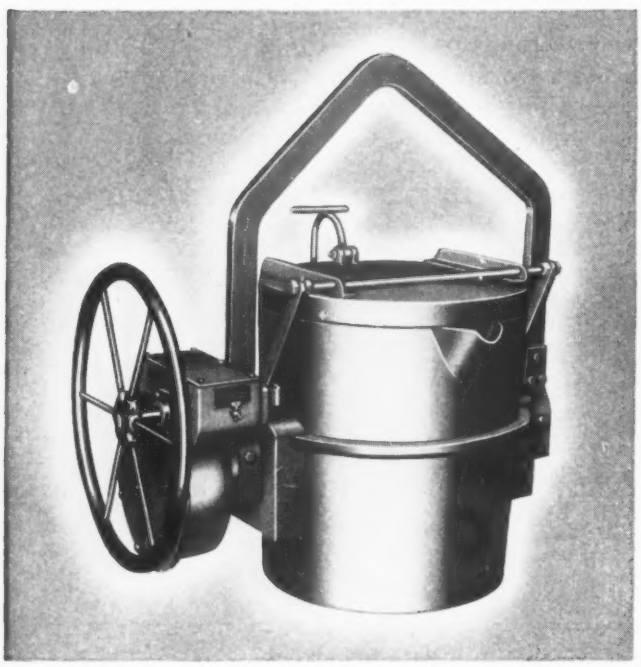
Address_____

City_____ Zone____ State_____

YOU'LL FIND THE TYPE LADLE YOU WANT AT

Ladle Headquarters





Industrial Equipment has all the ladles: teapot spout . . . covered . . . cylindrical . . . reservoir . . . buggy . . . bottom discharge . . . and many others, standard and special.

Each represents the last word in proven design and operating efficiency. All Industrial Crane Ladles are available with Industrial's revolutionary new universal bail which completely eliminates binding from heat or misalignment.

All geared ladles use Industrial's new hi-safety, self-locking worm gearing which uses no gaskets and which can be easily adjusted by anyone.

Write for Industrial's latest catalog. Illustrations, sizes, dimensions, technical features: all are included.

LADLES

SHANKS

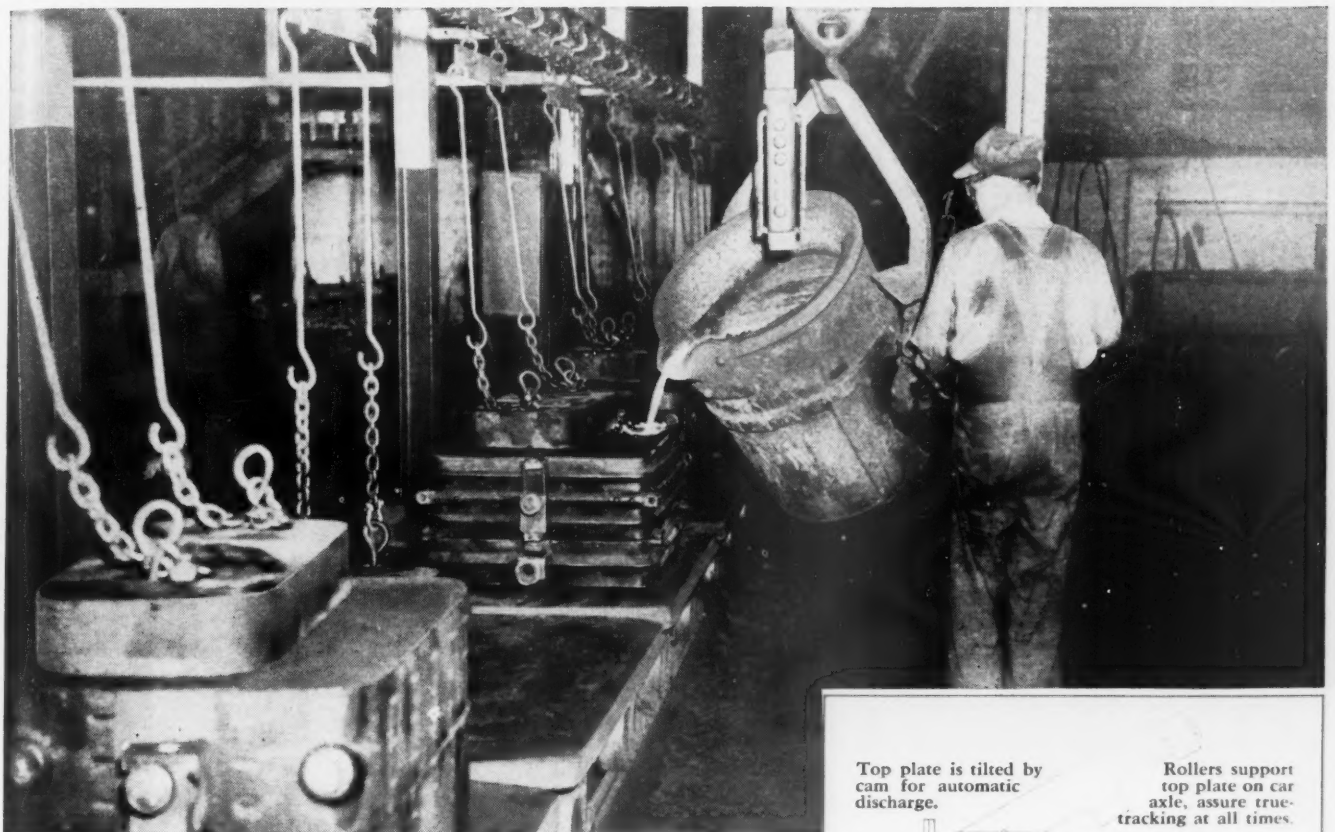
BOWLS

TONGS

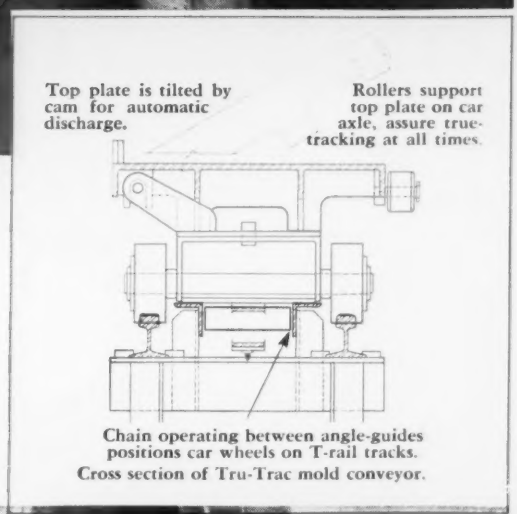
Industrial
EQUIPMENT COMPANY

115 NORTH OHIO ST., MINSTER, OHIO

Move molds from closing to shakeout—continuously... automatically... at low cost



Southern pipe foundry mechanizes entire pouring operation. Tru-Trac mold conveyor, Link-Belt weight-setting overhead trolley conveyor and overhead pusher type ladle conveyor are synchronized.


Top plate is tilted by cam for automatic discharge.
Rollers support top plate on car axle, assure true-tracking at all times.

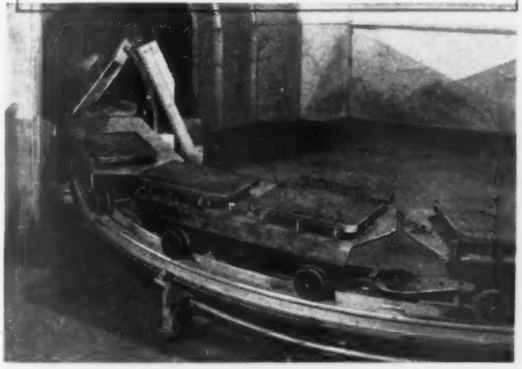
Chain operating between angle-guides positions car wheels on T-rail tracks.
Cross section of Tru-Trac mold conveyor.

LINK-BELT Tru-Trac Conveyor carries molds through molding, pouring, cooling and shakeout with maximum efficiency

MECHANIZATION by Link-Belt pays foundries big dividends in increased production . . . better casting at lower cost . . . improved working conditions. Take the Tru-Trac Mold Conveyor as an example.

Without ever leaving their individual cars, molds travel irregular paths . . . up and down inclines. Tru-Trac makes possible centralized, synchronized pouring . . . mechanical weight shifting . . . automatic mold discharge. And because exhaust hoods cover the cooling and shakeout zones, noxious smoke and fumes are eliminated.

Tru-Trac is one of several types of Link-Belt mold conveyors. Link-Belt also builds a full line of other casting and sand handling and preparation equipment. In addition, our foundry engineers can draw on Link-Belt's broad experience in foundry mechanization. It's an unbeatable combination—a sure way to bigger foundry profits.



No attendant is required at the shakeout position because of automatic dumping. Note that bottom boards are retained on the conveyor

LINK-BELT

CONVEYORS and PREPARATION MACHINERY

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13,064

MEMBER FEMA

900-lb. Core Baked Overnight

WITH TRULINE® AS THE BINDER

This is just one of many huge cores—some even heavier—baked thoroughly in one night by a large Eastern iron foundry, using Truline Binder in the mix. With former binders, baking took twice as long.

Iron foundries everywhere find that Truline not only cuts baking time up to 50%, but reduces new sand and binder costs. There's also less cleaning and chipping, because Truline-bonded cores collapse easily, shake out fast, reduce penetration and veins to a minimum.

Truline Binder can help *you* get more out of your baking ovens . . . save labor and materials . . . obtain cleaner, smoother castings. Our foundry service men will be glad to give you details.

Naval Stores Department

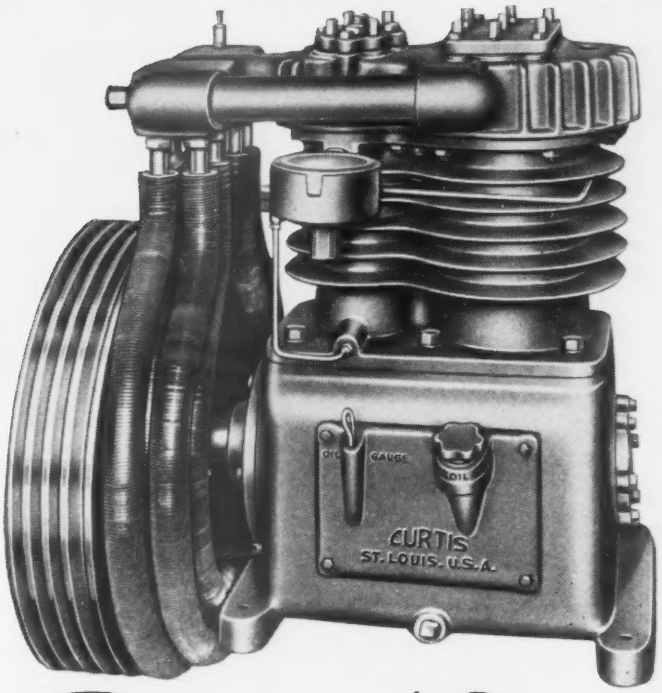
HERCULES POWDER COMPANY

INCORPORATED

920 King Street, Wilmington 99, Delaware

MORE AIR Per Horse Power

- IT'S TWO-STAGE
- IT'S AIR COOLED
- SELF OILING



The New Curtis

MODEL 98 AIR COMPRESSOR

TWO-STAGE AIR COOLED 15 AND 20 HORSEPOWER

TWO-STAGE — More air per kilowatt hour, assuring savings in power bill.

AIR-COOLED — No expensive water bills; eliminates plumbing installation costs.

INTERCOOLER — Four section, finned, providing unusually effective cooling between stages; cooled by cyclone of air from fan flywheel

SELF OILING — Simple, positive centro ring method; provides pressure lubrication of connecting rod and pistion pin bearings.

TWO TIMKEN MAIN BEARINGS — Tapered rollers; provide easy adjustment made externally without dismantling compressor.

VALVES — Readily removable as assembled units without removing cylinder head or breaking pipe connections or gasket joint.

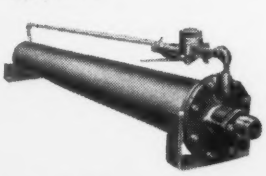
CRANKSHAFT — Counterbalanced, drop forged — two main bearings — no overhung bearing.

PRECISION WORKMANSHIP — Assures long life and minimum maintenance.

EXPERIENCE — Backed by 99 years of manufacturing — assures you dependable, troublefree service.

Available as a simple compressor or base mounted — motor driven.

LET ONE MAN DO THE WORK
with this Curtis air-operated equipment.



AIR CYLINDERS — for almost any pushing, pulling or hoisting operation.

AIR HOISTS — for low-cost lifting or lowering of materials or machines.

-726

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Co.
1922 Kienlen Avenue, St. Louis 20, Mo.

I am interested in items checked below:

☐ THE NEW MODEL 98 ☐ AIR HOISTS ☐ AIR CYLINDERS
☐ AIR COMPRESSOR

Name.....

Firm.....

Street.....

City.....Zone....State.....

CURTIS PNEUMATIC MACHINERY DIVISION of Curtis Manufacturing Company

1922 KIENLEN AVENUE ST. LOUIS 20, MO.

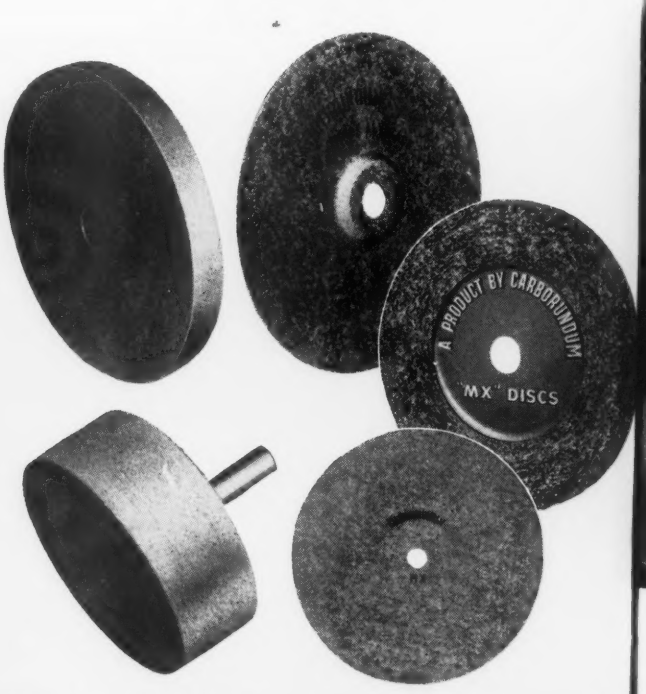
SUPERLATIVE FOR

STRAIGHT WHEELS
... for removing flash from non-ferrous castings.

MOUNTED WHEELS
... for removing tool marks and scratches from finished surfaces.

MX

the versatile, long life, self-cleaning, high strength, cushion-action abrasive



by CARBO

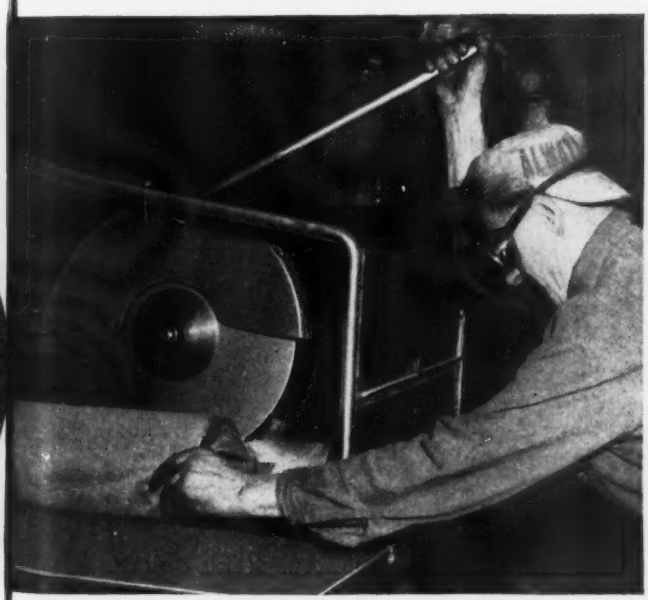
TRADE MA

"Carborundum" and "MX" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

RCLEANING UP CASTINGS

DEPRESSED CENTER WHEELS
...for removing mold marks from non-ferrous castings.

DISCS
...for removing flash from cast iron housings. Also for removing fins between molded sections of castings.



PRODUCTION CUT-OFF WHEELS
...for cutting gates and risers from all types of non-ferrous castings.

MX—one great product in 5 distinct forms—each one a superior cost-cutter for foundrymen everywhere!

The reason lies in the MX bond, tough yet resilient—it provides a fast-cutting action that's extremely soft and clean, yet rugged enough to perform many heavy-duty operations.

Get the MX story from your CARBORUNDUM or distributor salesman —or write Dept. F 81-60

RUNDUM

MARK

offering ALL abrasive products...to give you the proper ONE

81-60

---the Air You Breathe

Is Better with—
Peters-Dalton Dust Collecting Systems

On Their Way—
Bench Type Dust Collectors

This Dust Control System by Peters-Dalton is shown on its way to protect the health and increase the efficiency of another plant's employees. These custom-made and engineered Bench Type Dust Collectors were designed for use in Aircraft Engine Plants where processing (buffing, polishing and grinding) of engine parts creates a serious health-impairing factor.

PD engineers solve the most difficult Dust Collecting problems, including those requiring unusual hooding or conveying for wet collection dust control. We would be pleased to make available to you our store of knowledge and experience — write, wire or phone.

Paint Spray Booths *Drying and Baking Ovens*
Dust Collecting Systems *Industrial Washing Equipment*

Peters-Dalton INC.
17906 Ryan Road • Detroit 12, Michigan

Dry dipping of port cores with DELTA GRAKOAT

DELTA CORE WASHES ARE USED *Exclusively* BY

STUDEBAKER

AT THEIR FAMOUS SOUTH BEND FOUNDRY

**Dry dipping of V-8 crankcase core with DELTA Z-Z-KOAT*

OTHER DELTA FOUNDRY PRODUCTS

CORE AND MOLD WASHES:

FOR ALL TYPES OF SAND CAST METALS: STEEL, GRAY IRON, MALLEABLE AND NON-FERROUS.

•

PARTING COMPOUNDS

•

MUDDING & PATCHING COMPOUNDS

•

NO-VEIN COMPOUND

•

MOLD SURFACE BINDERS-LIQUID

•

PERMI-BOND

•

DRI-BOND (Dry Binder)

•

BONDITE BINDER

•

96•B SAND RELEASE AGENT

•

CORE ROD DIP OIL NO. 224X

•

SAND CONDITIONING OIL

•

CORE OILS

•

. . . FOR *QUALITY, SPEED* AND *ECONOMY*

DELTA GraKoat Wash . . . (the original white plastic-type wash developed by DELTA laboratories 18 years ago) has been used consistently by leading automotive and tractor foundries ever since it was first introduced.

Here are the reasons why:

1. **EASY TO APPLY**
2. **MOISTURE PROOF**
3. **NO PRECIPITATION**
4. **NO GAS**
5. **HIGHLY REFRACTORY**
6. **UNUSUALLY HIGH FUSION**
7. **ADHERES TO SAND**
8. **PRODUCES SMOOTHER SURFACES**
9. **COST LESS TO USE**

*DELTA Z-Z-Koat Wash is a zirconium wash. It has all the characteristics of DELTA GraKoat Wash plus a higher fusion point and heat conductivity which produce a quick surface-metal set.

A liberal working sample will gladly be sent to you, free of charge, at your request.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SPECIALIZED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

Castings for today and tomorrow need constant improvement. A new help is now offered. Use of Rare Earth materials yields better, definitely uniform physical properties, and gives added assurance of meeting specifications.

A special product, "Rare-Met" T-Compound, developed by the Molybdenum Corporation, is most convenient and most thoroughly approved for use in both steel and nodular iron.

Having its own huge rare-earth deposits, the Molybdenum Corporation has devoted special research to these materials and can give advice on a wide variety of applications. You may wish to investigate.

As a supplier of Molybdenum, Tungsten, Boron, and other alloying materials, the Molybdenum Corporation welcomes correspondence on any requirement.

AMERICAN Production, American Distribution, American Control, Completely Integrated

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco

Sales Representatives: American Steel and Supply Co., Chicago; Edgar L. Fink, Detroit; Brumley-Donaldson Co., Los Angeles, San Francisco

Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.

Works: Washington, Pa.; York, Pa.

MOLYBDENUM CORPORATION OF AMERICA
Grant Building Pittsburgh, Pa.

MCA

PERFECT SURFACE IS A "MUST". . .

Large drying rolls, like the one below receiving its final polishing pass, are used in "Yankee Dryer" paper-making machines which turn out soft facial tissue. Even slight surface flaws in these eight- and twelve-foot diameter castings cause them to be rejected.

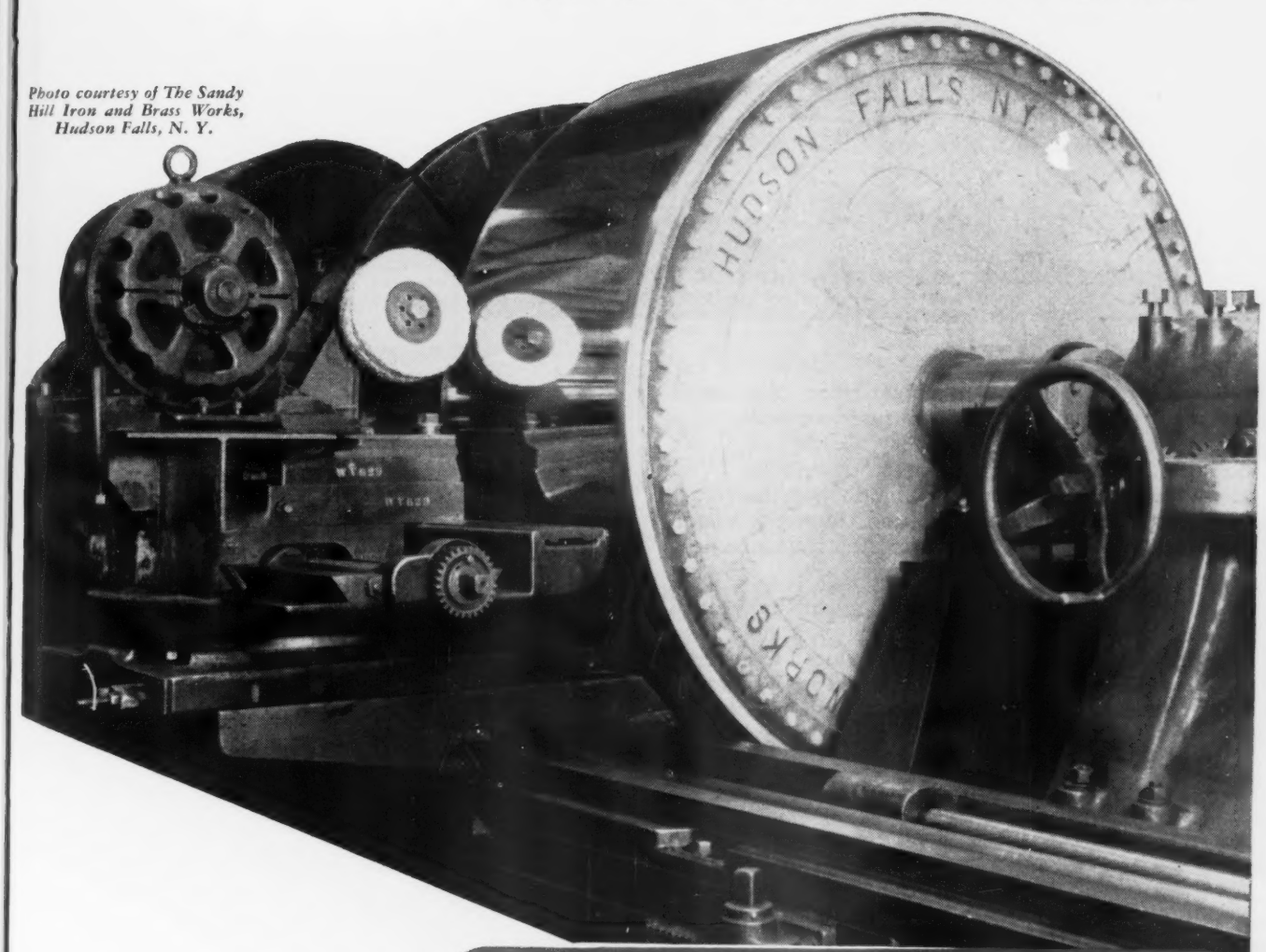
So they use CHATEAUGAY PIG IRON

. . . the low-phosphorus, copper-free pig iron that has eliminated scrap losses in countless "tough casting" jobs. With CHATEAUGAY, consistently uniform "physicals" assure predetermined fine grain structure throughout every casting, regardless of size or shape.

Whatever the requirements of your castings—if ordinary pig iron won't do the job—NOW is the time to investigate the *exclusive* advantages of premium CHATEAUGAY. A Republic Pig Iron Metallurgist will be glad to give you the complete facts at your convenience. Write today to:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Photo courtesy of The Sandy Hill Iron and Brass Works, Hudson Falls, N. Y.



Republic PIG IRON

"CHATEAUGAY" Low-Phosphorus, Copper-Free

"REPUBLIC" (Northern) Foundry, Basic and Malleable

"PIONEER" (Southern) Foundry and Basic

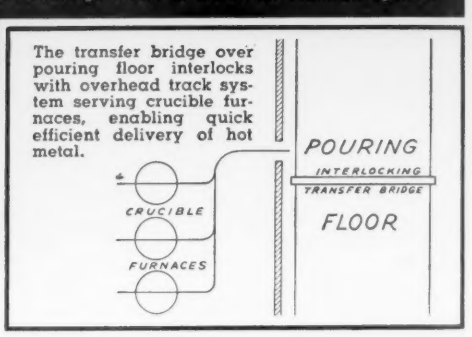
REPUBLIC STEEL

JUMPS FROM 3 HEATS TO 8 DAILY . . .

Tramrail System works wonders in 10-man foundry

Crucibles reach the molds quickly and the work is made easy and fast.

Crucibles go direct to molds on Tramrail system.


The transfer bridge over pouring floor interlocks with overhead track system serving crucible furnaces, enabling quick efficient delivery of hot metal.
POURING
INTERLOCKING
TRANSFER BRIDGE
FLOOR
CRUCIBLE
FURNACES

THE installation of a small inexpensive Cleveland Tramrail hand-propelled system at the Modern Brass Foundry, Columbus, Ohio, made a terrific difference in their operations. With no increase in man power, it made possible eight heats in a day instead of three, formerly usual. Despite more than double output, the men are now less fatigued at the end of a day.

No. 70 crucibles (240 lbs. capacity) are now used instead of No. 60 (200 lbs. capacity). It has been found that very little more heat is required to prepare 240 lbs. of metal than needed for 200 lbs. This provides a big saving in heat, which in itself goes a long way toward paying for the Tramrail equipment.

When they were considering installation of the overhead equipment, Modern Brass was quite concerned over a fear that it would not be fast enough and that they would be confronted with a large heat loss that would be troublesome. This fear has proven wholly unfounded. They have learned that working with Tramrail equipment is much faster than when pouring by hand.

Mr. R. E. Gleich, president, said as far as he was concerned the Cleveland Tramrail system paid for itself the first day in operation, because it so eased their work. After the first day he knew they could never afford to be without it. As a matter of fact, the equipment actually did pay for itself within a few weeks out of savings it brought about.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3829 East 286th St., Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

KORBOND
Core Oil
№ 861-A

A SPRAY FOR GREEN SAND CORES and MOLDS "B"

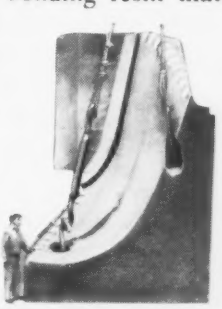
We will be glad to send bulletins that describe Korbond Core Oils in more detail and explain how Top-bond can pay its own way as an aid to finer castings.

Steel is the measure of our strength as a nation, the source material for armaments and the key to our industrial expansion.

Castings made from steel are doing a job thought impossible a few years ago and all this with the help of United's Core Binders. Finer castings in steel and alloy are being produced every day with Korbond and Top-bond.

KORBOND CORE OILS have done a job for the most delicate Monel Castings and for huge castings in steel that weigh-in at 80 tons, — water wheels for our hydro-electric plants.

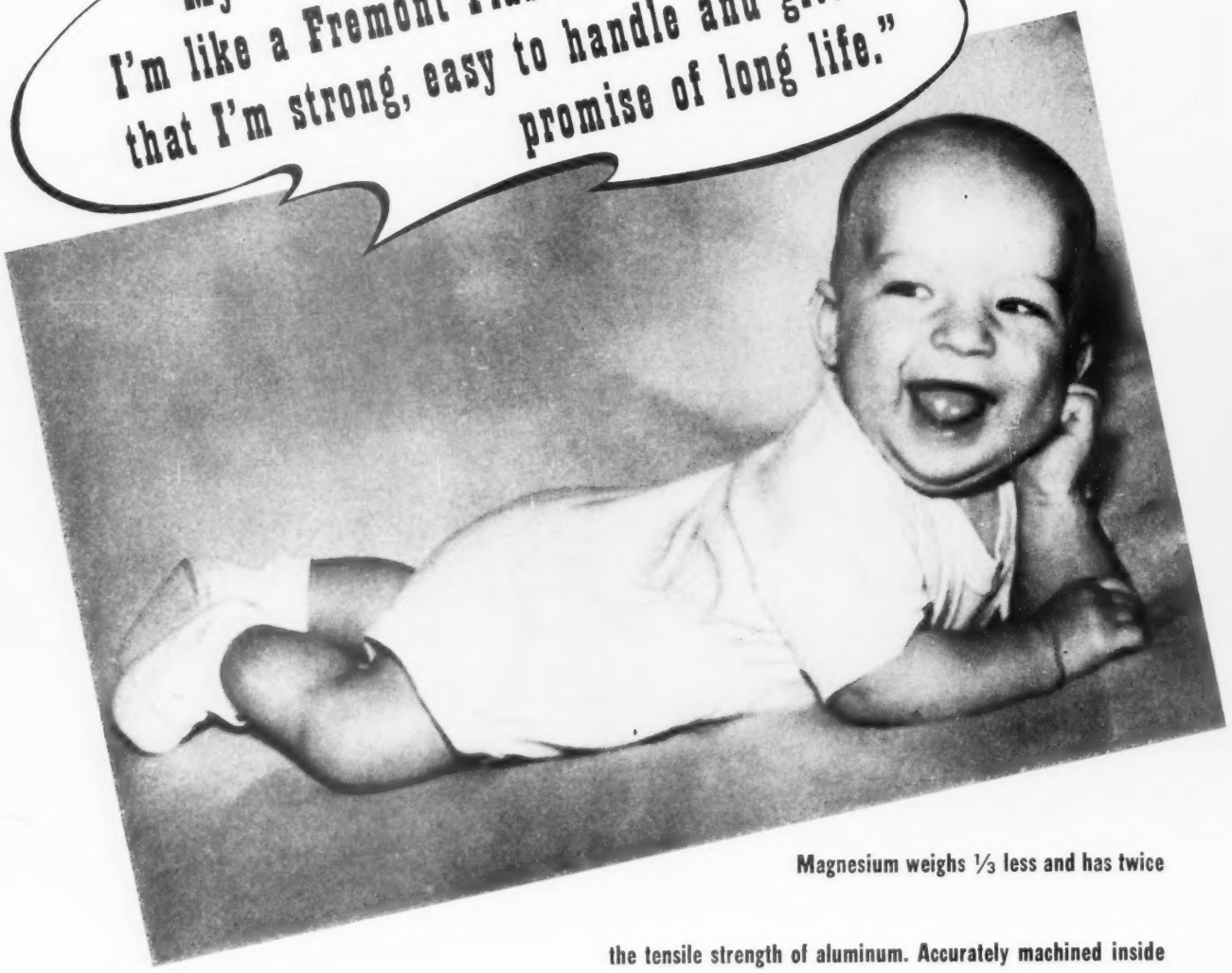
TOP-BOND is a companion product — a spray for green sand cores and molds which builds up surface hardness and protects firm sharp edges from rubbing. Top-bond will air dry, leaving a bonding resin that really ties down every grain of sand. It will help produce clean smooth castings and save endless expense in the cleaning room.



Fifteen of these segment cores weighing 7 tons each and made with Korbond Core Oil are used by the Erie Forge and Steel Company in pouring one 80 ton steel runner.

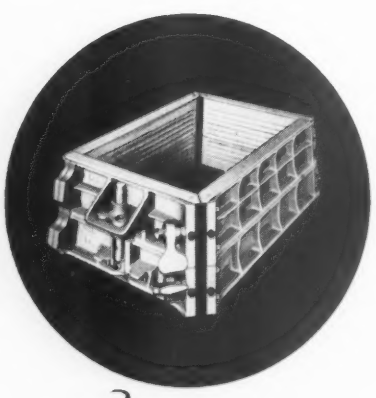
UNITED OIL MFG. COMPANY
1429 WALNUT STREET, ERIE, PA.

"My dad says
I'm like a Fremont Flask . . . .
that I'm strong, easy to handle and give
promise of long life."



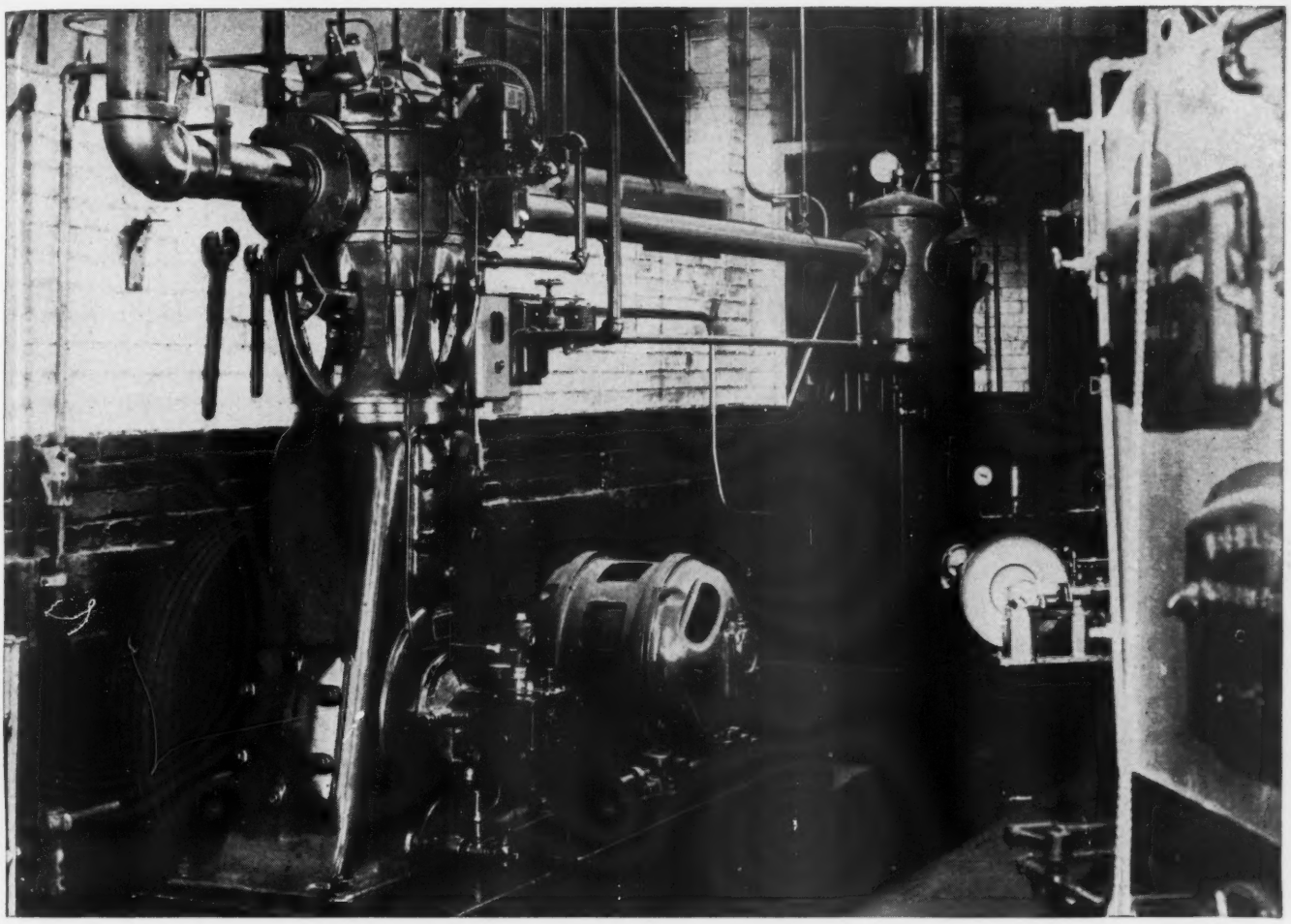
Magnesium weighs ⅓ less and has twice the tensile strength of aluminum. Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges, make more exacting work possible with Fremont Flasks. Write today for free literature and prices on the new

FREMONT SPREADLOCK FLASK, FREMONT STANDARD SLIP FLASKS, FREMONT CAST IRON OR CAST ALUMINUM JACKETS



THE FREMONT FLASK COMPANY

Fremont, Ohio

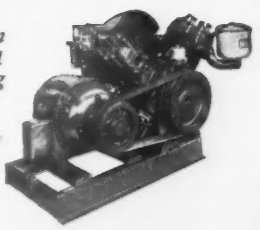


SAVE VALUABLE SPACE WITH THE EFFICIENT

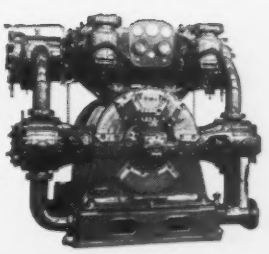
JOY WG-9 HEAVY DUTY AIR COMPRESSOR

The JOY WG-9 Vertical, with its small base, saves valuable floor space. Built in a range of sizes to 881 CFM, for continuous heavy-duty service. The complete line of JOY stationary units—high and low pressure compressors, oil-free compressors, boosters and vacuum pumps—includes a type for every need, each incorporating exclusive features developed by JOY research. Supplementary products include the only complete line of vaneaxial fans and blowers, and the new JOY Oxygen Generator. ● *Write for free Bulletins.*

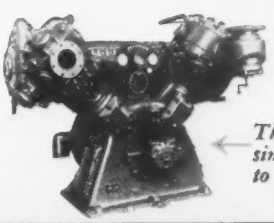
The JOY WL-80, in eleven sizes up to 641 CFM, with operating pressures to 125 psi.



The JOY WN-114, in single or twin units up to 7312 CFM.



The JOY WN-112, in single or twin units up to 3656 CFM.



Consult a Joy Engineer

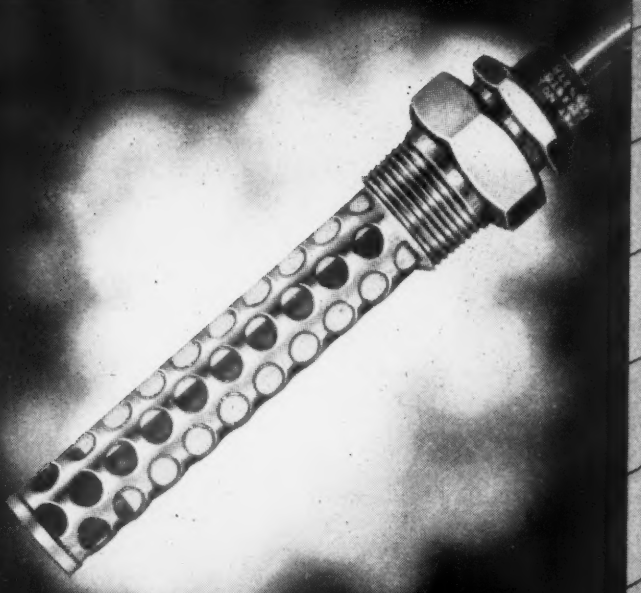
WAD 13786

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Amazingly simple way to measure BLAST AIR DEW POINT



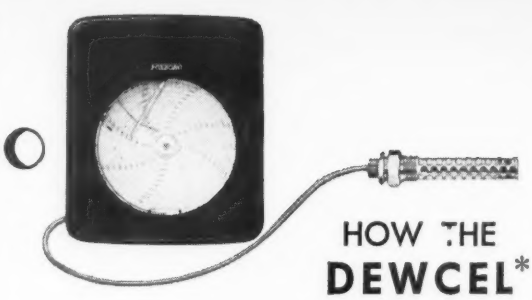
directly . . . accurately . . . continuously

Now you can measure or control the moisture content of blast air with simplicity and accuracy never before obtainable!

The exclusive Foxboro Dewcel*, an entirely new type of humidity-sensitive element, has made this possible, and at surprisingly low cost. Coupled with a Foxboro Recorder or Controller, the Dewcel offers these outstanding advantages:

1. Direct recording in dew point temperature, at existing pressure.
2. Wide working range — even operates at sub-zero temperatures.
3. Neither adds nor removes water from atmosphere.
4. No water box or circulation of air required.
5. Simplicity that eliminates maintenance.
6. High sustained accuracy.
7. Initial and operating economy.

Record blast dew point and know your moisture conditions! Investigate the Foxboro Dewcel element . . . write for Bulletin 407. A nearby Foxboro Engineer will also be glad to discuss blast moisture *control*. **The Foxboro Company, 321 Neponset Avenue, Foxboro, Mass., U.S.A.**



HOW THE DEWCEL* WORKS

The Dewcel element is a thermometer bulb (liquid-filled or electric-resistance type) jacketed with lithium-chloride-impregnated woven glass tape. Over this are wound two spaced gold or silver wires connected to an AC source. The lithium chloride absorbs moisture, allowing current to flow, generating heat, and raising the temperature. Equilibrium temperature is reached when vapor-pressure of the moist salt exactly balances that of the surrounding air or gas. The System translates this temperature into direct readings of dew point.

Thus, Foxboro Dew Point Instruments give direct readings or control of dew point from —50°F. to 142°F. at working temperatures from —40°F. to 220°F. Readings easily converted to absolute or relative humidity.

*Trade Mark

FOXBORO
REG. U. S. PAT. OFF.

RECORDING · CONTROLLING · INDICATING
INSTRUMENTS

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

YOU CAN CUT DOWN DISCARDS WITH MOGUL

LARGEST SELLER IN THE FIELD!

• CUTS DRYING TIME • MAKES SMOOTHER CORES

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

Write Technical Sales Department

Kordek, the preferred dry bond for cores . . .

CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, N. Y. 4, N. Y.

OTHER DINGS PRODUCTS FOR THE FOUNDRY—

Electric and Non-electric Magnetic Pulleys

Non-electric Magnetic Drums

Non-electric Perma-Plate Magnets

Self-Cleaning Perma-Plate Magnets

Rectangular Suspended Magnets

Self-Cleaning Rectangular Suspended Magnets

Portable and Stationary Pulley-type Separators

DINGS ALL-WELDED, WEATHERPROOF LIFTING MAGNETS:

- LIFT A LITTLE MORE
- WEIGH A LITTLE LESS
- LAST A LITTLE LONGER

— BUT COST NO MORE

BACKED by over 50 years of experience in the field of electro-magnet construction. Dings has supplied more foundries with magnetic separators than any other firm. When you need a lifting magnet check the DINGS.

Write for catalog B-1401-A giving construction details, capacities, ratings and dimensions.

DINGS MAGNETIC SEPARATOR COMPANY
4708 W. Electric Ave., Milwaukee 46, Wis.

Dings Magnets

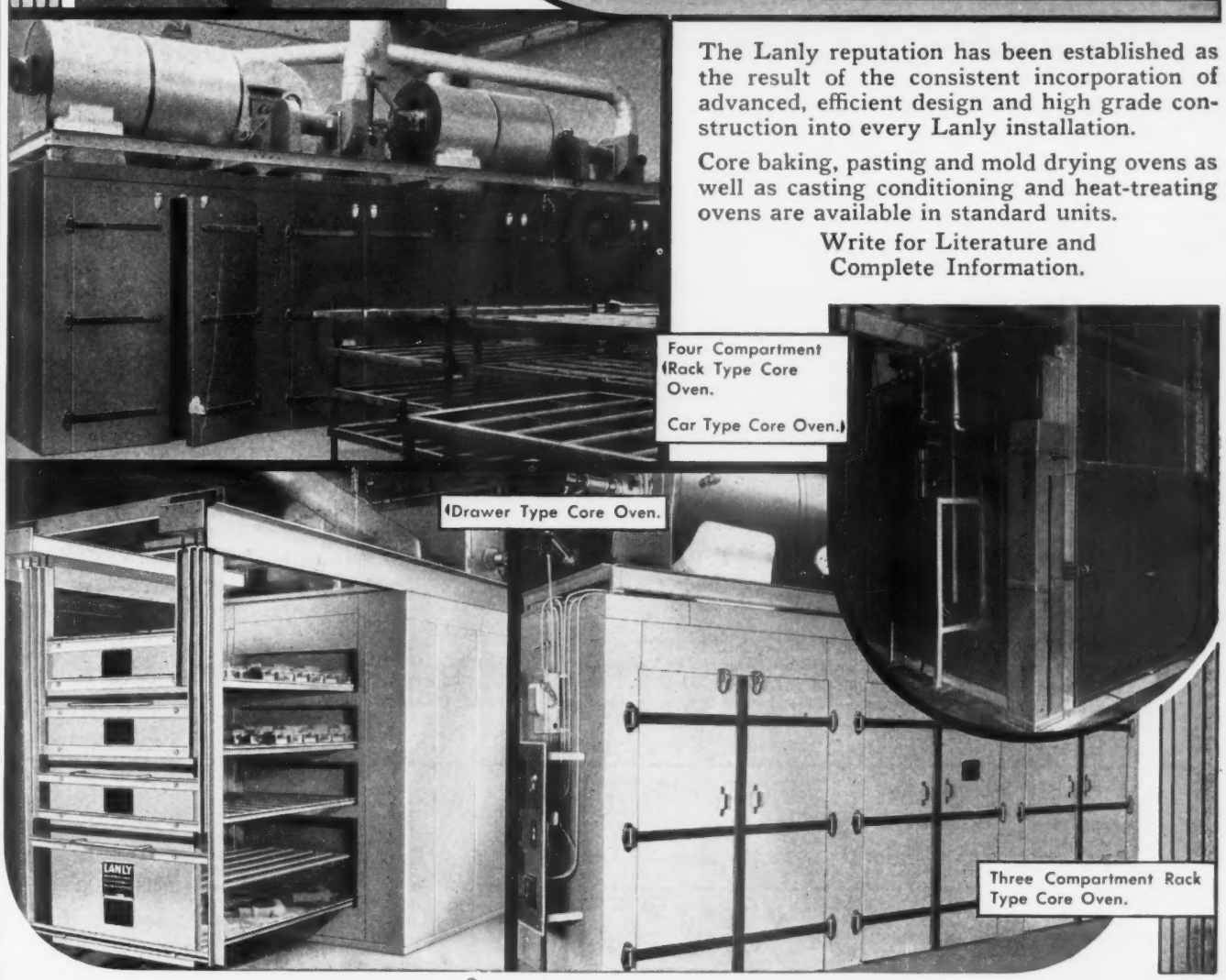
LM-3

Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.



THE WORLD MELTS WITH *Lectromelt** ...

35 Countries...1,056 Lectromelt Furnaces...2,480,000 KVA

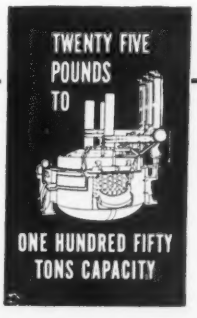
LECTROMELT FURNACES THE WORLD OVER

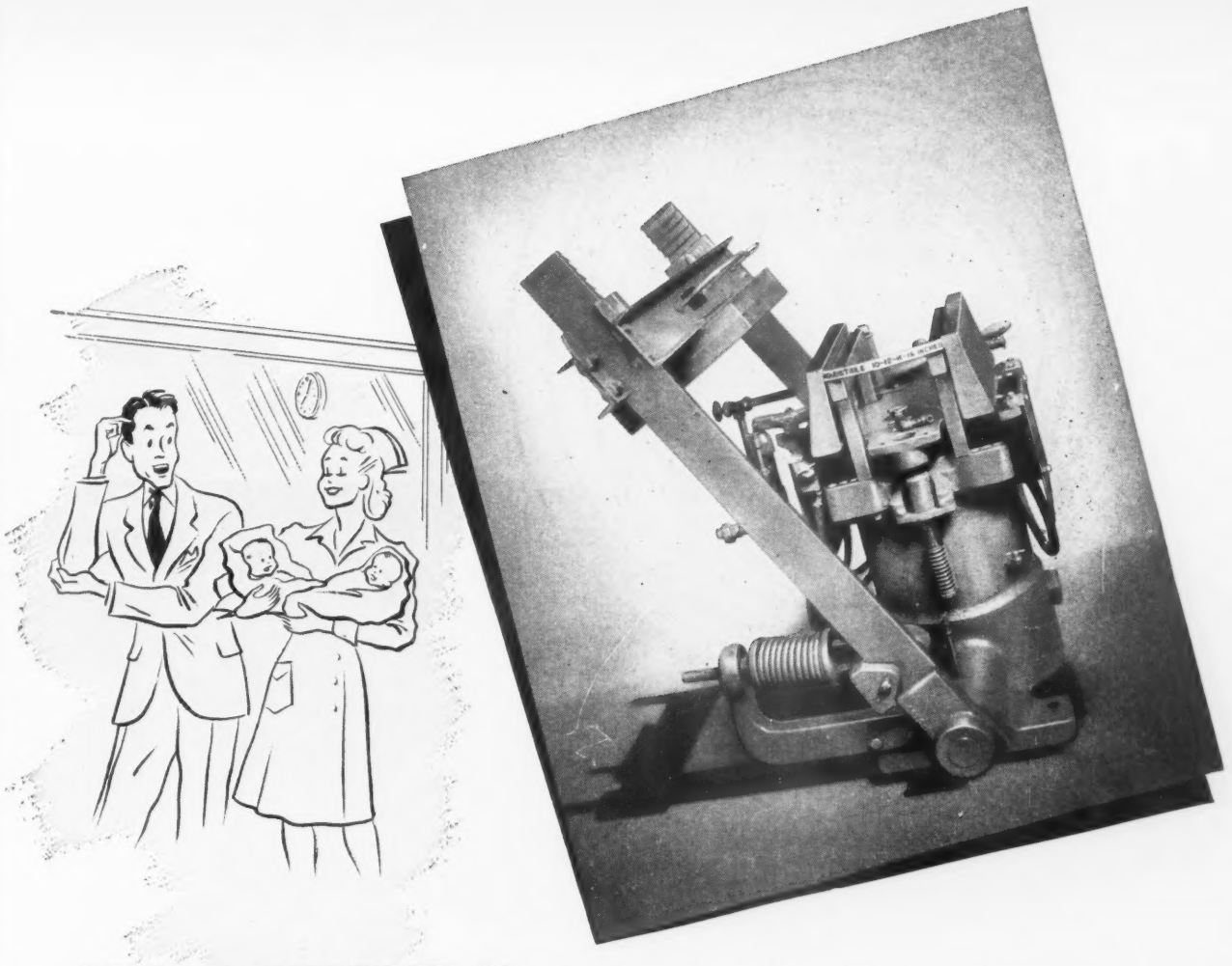
Country	No. of Furnaces	Country	No. of Furnaces
AFRICA	28	MEXICO	20
ARGENTINA	2	NEW CALEDONIA	2
AUSTRALIA	12	NEW ZEALAND	4
BELGIUM	2	NORWAY	2
BOLIVIA	2	PANAMA CANAL	2
BRAZIL	30	REP. OF PANAMA	1
CANADA	50	PERU	4
CHILE	11	PHILIPPINE ISLANDS	3
CHINA	17	POLAND	3
COLOMBIA	7	PORTUGAL	4
DENMARK	2	RUSSIA	69
ENGLAND (BR. ISLES)	70	SPAIN	26
FINLAND	4	SWEDEN	8
FRANCE	4	TURKEY	2
HAWAII	1	UNITED STATES	635
ITALY	16	URUGUAY	1
INDIA	9	VENEZUELA	1
JAPAN	2		

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

WHEN YOU MELT... MOORE RAPID *Lectromelt*





IT DELIVERS WHAT FOUNDRYMEN EXPECT

QUALITY molds and more of them—long life—low upkeep—flexibility that puts the machine "at home" in either production or jobbing shop . . . that's the story with this Tabor Yoke-type Jar-squeeze Flask-lift machine.

Design is the answer! Pattern plate supports and flask-lift sides keep a proper relation between pattern plate and flask surfaces. This means a "sand seal" when the mold is closed. Finning is eliminated . . . savings result.

Tolerances are so close that the match on the castings will depend only on the alignment of patterns.

In addition to its high-production features, this machine is flexible. Its 13" cylinder delivers a uniform squeeze — a smooth 4" draw. Adjustable open-end frame takes pattern plates 10" to 16" wide, at lengths limited only by the 260 sq. in. plate area. Also available with column- or cantilever-type head.

Write today for Bulletin # 501 describing this worthy member of the Tabor family—a line of molding machines and allied foundry equipment built to *deliver* what foundrymen *expect.*

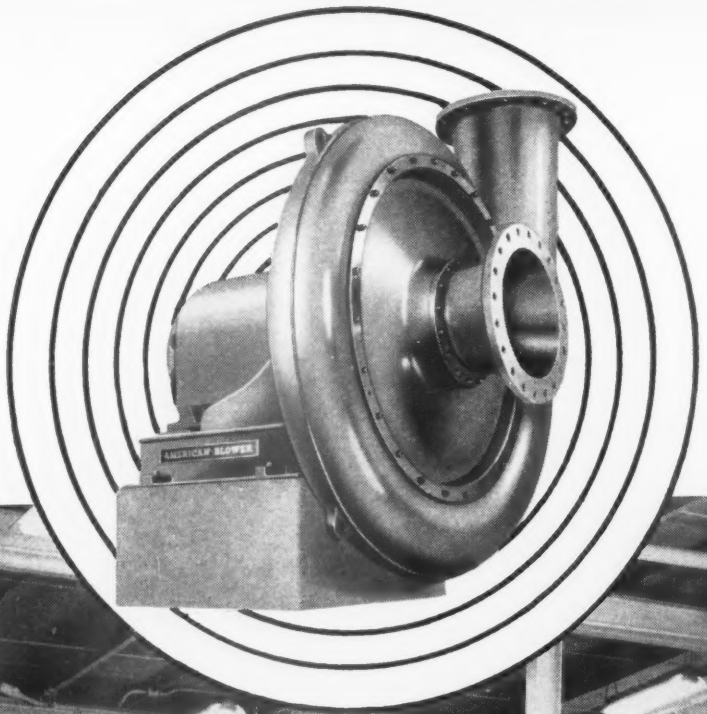
REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.



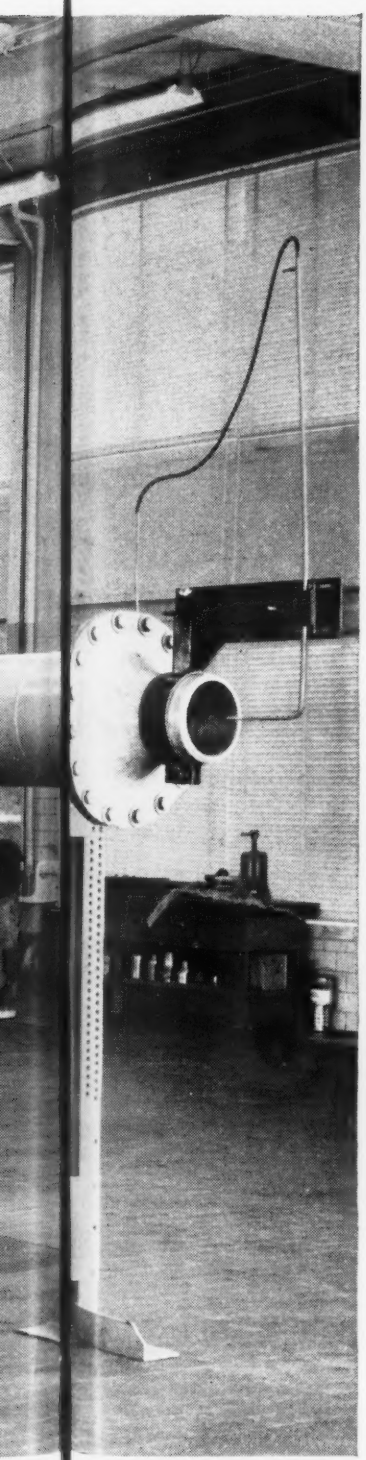
CENTF

built da

AMERICAN BLOWER

TFUGAL COMPRESSORS

lt backed by a great name in air handling



When you select American Blower Single Stage Centrifugal Compressors for your jobs, you get superior quality and workmanship.

Prior to shipment, each compressor is thoroughly tested for mechanical and performance characteristics in accordance with the A. S. M. E. Power Test Code for Centrifugal Compressors and Exhausters.

The photograph at left shows part of the extensive and intricate testing equipment used in American Blower's modern research laboratory.

American Blower Single Stage Compressors are available in sizes from 30 to 600 HP, pressures from 1¼ to 3¾ lbs. They're compact and are adaptable to all types of drives.

For technical data, consult the nearest American Blower Branch Office or write us for Bulletin 109.

Whether you need equipment for heating, cooling, ventilating, air conditioning, vapor absorption, fume removal, dust collecting, mechanical draft, heat transfer or smooth power transmission thru Gyrol Fluid Drives — American Blower manufactures a complete line of products to meet your requirements. Helpful technical literature is available on each product. Branch offices, staffed with trained sales engineers, are conveniently located in all principal cities.

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Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

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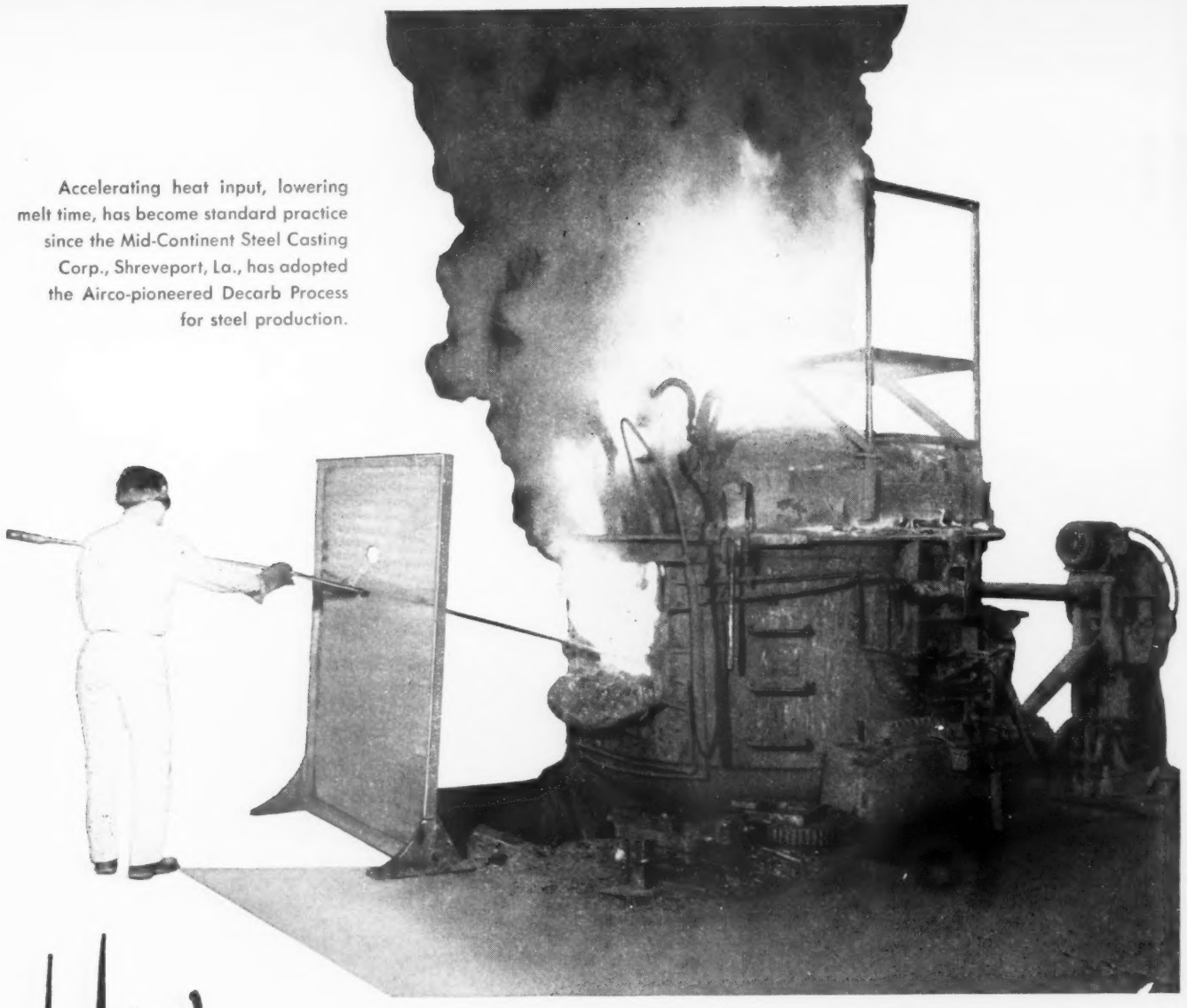

Accelerating heat input, lowering melt time, has become standard practice since the Mid-Continent Steel Casting Corp., Shreveport, La., has adopted the Airco-pioneered Decarb Process for steel production.

How TO INCREASE STEEL PRODUCTION

use less power–save more time

WITH AIRCO'S STEEL DECARBURIZATION PROCESS

Oxygen injected under the slag cover at 80 psi has become the answer to Mid-Continent's faster steel production.

Increased bath temperature–faster carbon elimination–lower power consumption . . . time saved per heat . . . gives Mid-Continent a product with the same normal chemistry, slag control and fluidity as they formerly received using ore. Additional workflow advantages are gained by the elimination of ore handling and storage problems.

Oxygen decarburization for faster heats may be put to work for you. The facilities of our Technical Sales Division may furnish you with the answers you need to know about this process for your use. If you are interested in obtaining further information, please address your nearest Airco office.

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Gives You the Lowest Overall Cleaning Costs You've Ever Had

and Pangborn can prove it, without any cost to you!

THAT'S a mighty strong statement to make—and Pangborn wouldn't dare make it if we couldn't prove it! We challenge you to test Malleabrasive in your own shop for 30 days! We make all the arrangements, provide the forms, supervision, etc. Your machines are expertly adjusted by Pangborn engineers to get the greatest benefit from Malleabrasive. The test is run fairly, scientifically — your work schedule is never interrupted. At the end of the 30 days, you'll have proof that Malleabrasive has done a better cleaning job at lower overall cost than any other abrasive!

We *know* we can convince you, because we've *already proved* Malleabrasive in foundries all over the country. What's more, since Pangborn *makes* blast cleaning machinery, we have tested *all* the abrasives, to determine the best. Malleabrasive won on all counts!

The *original* premium abrasive, Malleabrasive has approximately 50% longer life than other premium abrasives—2 to 4 times the life of ordinary abrasives. It reduces down-time and protects your investment because Malleabrasive makes machinery parts last longer. It turns out perfectly cleaned parts *every time*, and actually costs far less per ton of castings cleaned!

Don't just take our word for it! Let Pangborn engineers run this impartial test in *your* shop. For more information, write to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Malleabrasive Guarantees Lower Cleaning Costs and Better Cleaning Jobs Than Any Other Abrasive!

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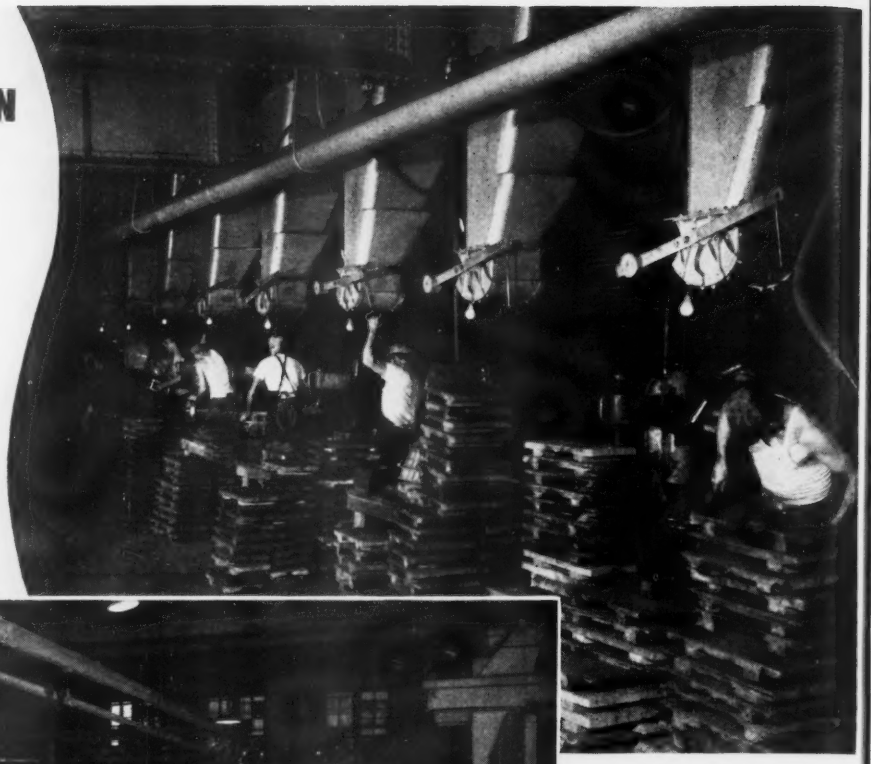
BLAST CLEANS CHEAPER

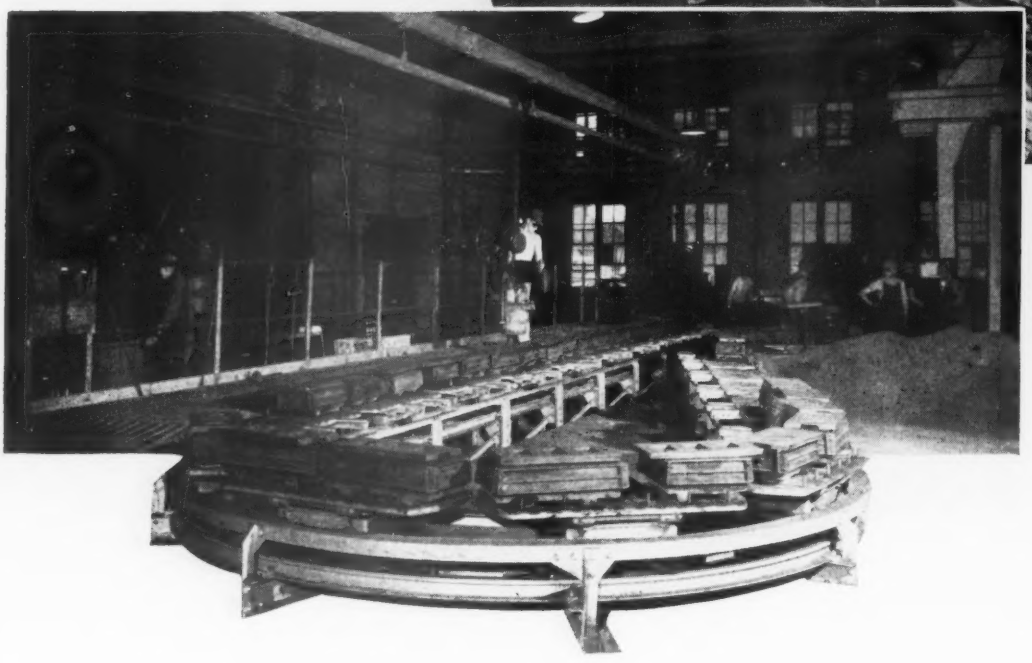
with the right equipment for every job

*U.S. Patent #2184926 (other patents pending)

NO MODERNIZATION WITHOUT MECHANIZATION

So Call In a JEFFREY ENGINEER





These two photos depict a Jeffrey-equipped Foundry. It is completely modernized to provide the ultimate in plant efficiency. Our Foundry Engineers are generous in their desire to help you modernize your operations.

Aerators
Bucket Elevators
Chains
Clamshell Valves
Cleanarators
Crushers

Casting Conveyors
Disintegrators
Feeders
Flask Fillers
Apron Conveyors

Paddle Mixers
Power Scoops
Mold Conveyors
Screens
Sanditioners

There must be a heap of satisfaction in having a completely-modernized Foundry . . . a smooth-running and harmonious system. Jeffrey has the equipment . . . the engineers to help you do just that . . . provide performance that enthuses the owner and the foundry superintendent alike. Give us a chance to go to work for you.

THE JEFFREY MANUFACTURING COMPANY
907 North Fourth St., Columbus 16, Ohio

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Galion (Great Britain Ltd.), Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio
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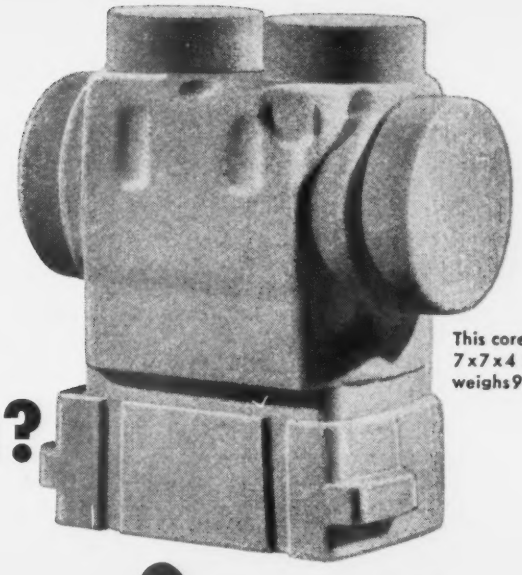
FOUNDROMATIC
Dielectric
SAND CORE DRYER

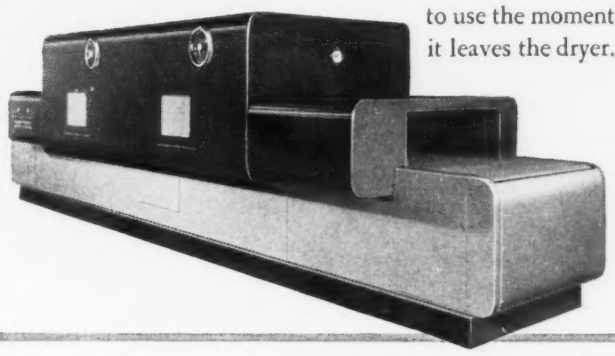


This core measures 7 x 7 x 4 inches . . . weighs 9¼ pounds.

Why take 1½ hours to bake a core like this?

dry it in 4 minutes

***Foundromatic* sand core dryers** take only a fraction of the time of conventional ovens, yet produce a core with smooth finish and superior shakeout characteristics. Best of all, the core is cool enough to handle with bare hands, and ready to use the moment it leaves the dryer.



Now there's no need to build up a stock of cores ahead of time. Use a *Foundromatic* core dryer and make cores only as you need them.

LOW FUEL COSTS TOO

There's no waste heat! All the heat goes into the core instead of the air. When there are no cores between the electrodes no energy passes between the electrodes.

Result: low fuel costs . . . no heat, smoke, fumes in the core room.

Find out more about this fast, economical way of drying cores. Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wis.

Foundromatic is an Allis-Chalmers trademark.

Questions and Answers . . . About Dielectric Sand Core Drying

1. *How does the core dry?*
By passing high frequency currents through the moist sand, the molecules are set in motion and the resultant friction generates sufficient heat to drive off the moisture from the inside.

2. *Why are resin binders used in place of core oils?*
Core oils require high temperatures and long drying time for complete polymerization. Resin binders cure at lower temperatures . . . approximately 250° F.

3. *What about collapsibility?*
Resin bonded cores have very good collapsibility, contributing to a faster, cleaner shakeout.

4. *I want a very hard core, but still want good collapsibility. What do I do?*
Spray the cores with a film of moisture just before putting on conveyor belt. This will give high surface hardness without affecting the collapsibility.

5. *Can core wash be eliminated?*
In many cases, yes. The resin forms a reducing atmosphere resulting in smooth castings, without necessity of applying core wash.

6. *Is any special or additional equipment needed?*
None, except plastic dryers to hold shaped cores. Marinite or transite plates are recommended.

7. *Can metal dryers or plates be used?*
Yes, but it will result in reduced production. The metal will act as a shield around the sand, requiring the core to be run a second time without the dryer or plate.

8. *I have metal dryers which I do not want to replace at once. Can I use them?*
Yes. Run the cores through in the normal manner. Turn the cores out on plates and remove the dryer and run the cores through again.

9. *How many plastic dryers will be needed?*
Far less than the normal amount of metal dryers. A maximum of 50 plastic dryers should suffice for each job unless more than one coremaker is working on the same job.

ALLIS-CHALMERS

Allis-Chalmers A-3890
Milwaukee 1, Wisconsin

Please send me new 8-page booklet 15B7306B containing complete information on the *Foundromatic* sand core dryer.

Name .....
Title .....
Company .....
Street .....
City ..... State .....

Readers' COMMENT

Useful in the Classroom

TO THE EDITORS:

I enjoy FOUNDRY very much and use it in classes continually. I am sure I would miss it if it were not available.

We have a unique setup here where engineering students are taught foundry procedure as a method of procuring products of desired shape and properties at a low cost. These students go into all divisions of industry with a respect for the foundry which I hope I may be able to continue to put over in the future.

RALPH A. SMITH
Instructor

Department of Mechanical Engineering
Tufts College
Medford 55, *Mass.*

* * *

Purdue's New Foundry

TO THE EDITORS:

May I take this occasion to express appreciation for the splendid publicity which Purdue University received through the September, 1952 issue of FOUNDRY. I am particularly pleased with the article by our student, Mayer, on page 266 of that issue. The illustrations are also excellent.

A. A. POTTER
Dean of Engineering

Purdue University
Lafayette, Ind.

* * *

Strainer Core Data

TO THE EDITORS:

In your issue of October, 1952 on page 129 under "Questions and Answers" a reader asks for data on strainer cores. Although the appended information may not be entirely what he asks for, it may be of some interest. The accompanying table appears as an entry in one of my old notebooks without any reference to the context from which it was originally taken. However, it appears to be from the work of Caesar Brunelli.

There is no need to match the total cross sectional area of the pencil runners with a single runner of the same section. A runner 25 mm diam will pass much more molten metal in a given time than will ten pencil runners each 8 mm diam.

J. L. FRANCIS
Senior Metallurgist

Foundry Services Ltd.,
Birmingham, England.

* * *

December Cover Appealing

TO THE EDITORS:

I wish to congratulate you upon the very fine illustration used on the cover of FOUNDRY for December.

I frequently glance at this painting, which is in my office, and every time I do so it stimulates my thinking as to the tremendous progress that has been made in the foundry industry.

I want to thank you for your interest and the very splendid use you have made of the painting.

W. H. WORRILOW
President

Lebanon Steel Foundry
Lebanon, Pa.

* * *

Our First Issue

TO THE EDITORS:

Our congratulations on receiving the first, September, 1892 issue of THE FOUNDRY which celebrates your 60th anniversary.

We took great delight in reading every page of this interesting and early publication and sincerely wish we had the opportunity of having a repeat on all of the early years, as there is so much valuable information which they contain and explains our advancement in the foundry industry.

Our congratulations on your 60th anniversary and we do hope you have many more of like periods hereafter.

CLYDE A. SANDERS
Vice President

American Colloid Co.
Merchandise Mart Plaza
Chicago 54

Original Recommendations of Brunelli

No. of Pencil Runners Wanted	Diam in mm	Area of Each sq mm	Total Area All Runners, sq mm	Diam, Single Runner of Same Area, mm	Casting Weight To Be Made, kg
1	4	12.5	12.5	4	1
1	7	39.5	39.5	7	10
5	4	12.5	62.5	9	20
5	7	39.5	197.5	16	70
10	5	19.7	197.5	16	160
10	8	50.0	500.0	25	400
16	8	50.0	800.0	32	1000

The Aviation Industry
DEPENDS ON METALS

Leading producers of aluminum, magnesium electric steel and foundry metals for the aviation industry find that GLC GRAPHITE ELECTRODES perform economically and dependably.

GLC GRAPHITE ELECTRODES are built for quality every step of the way from raw materials to finished products. Metal producers can depend on them for uniformity, strength, low oxidation.

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Photo by Hans Groenhoff

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Veterans on the Production Front . . .

Still Rolling After 22 Years' Service!

Note the riveted fittings on the Sterling Rolled Steel Flasks shown in the above illustration! Outmoded? Yes, of course! But isn't it amazing how these steel flasks continue to produce castings? After 22 years of steady, dependable service, these old timers are still rolling down the conveyor line.

Naturally, today, Sterling Flasks are of all-welded construction, fabricated from special hot rolled channel steel — *not pressed steel.* This assures even greater rigidity and longer life. The heavy flanges, with square corners and full-width bearing and the solid reinforcing bar around each section, provide strength and rigidity to withstand tremendous pressures, year after year. Partings are accurately machined — not just surface ground, but planed to an accuracy of .005". The thick flanges have plenty of steel for several refinishings.

Get the complete Sterling story. Write for copy of Foundry Equipment Catalog.

Have you received your copy of the new Sterling Booklet entitled "How to Select and Maintain Foundry Flasks"? Write for your copy.

STERLING WHEELBARROW COMPANY
Milwaukee 14, Wisconsin, U.S.A.

A 7371-1PC

Let's Sell Intelligently

From the standpoint of production, 1952, with estimated shipments of 16,500,000 tons of ferrous and nonferrous castings, was one of the better years in the history of the foundry industry. When all of the statistics have been collected, it probably will be found that shipments for the year just closed were almost the same as in 1948, and that the 1952 total was exceeded materially only by the record of 19,000,000 tons set in 1951.

Nevertheless, the foundry industry has gone through a marked transformation during the year. In contrast to the situation which prevailed in the immediate postwar period and shortly after the start of the Korean emergency, when demands for practically all types and classes of castings exceeded greatly the capacity to produce, many companies today are operating on a hand-to-mouth basis. The tremendous backlogs of orders so prevalent during the past few years have shrunk greatly, and in many instances have approached the vanishing point.

In other words, the foundry industry once more is back to normal. This is being reflected in a spotty production picture, the purchase of materials and supplies as needed, and a general complaint by foundry operators on the state of business.

While many see some increase in demand for cast products in 1953, present trends in purchasing emphasize strongly the need for more intelligent marketing of castings. It is doubtful if merely pounding pavements and cutting prices will provide any company or the industry with the proper share of castings business that should be produced by our expanding economy.

An intelligent merchandising program demands a quality product which can be sold at a fair price. It requires trained sales engineers who constantly study the needs of customers and prospects in an effort to improve present castings designs and find new uses for cast products. It needs a zeal for providing service to buyers and a willingness to see that delivery promises are kept.

Government studies indicate a potential demand for 29,000,000 tons of castings by 1975. Modern methods, intelligent merchandising and real sales promotion will be needed to reach that goal.

Frank G. Steinbach

Editor

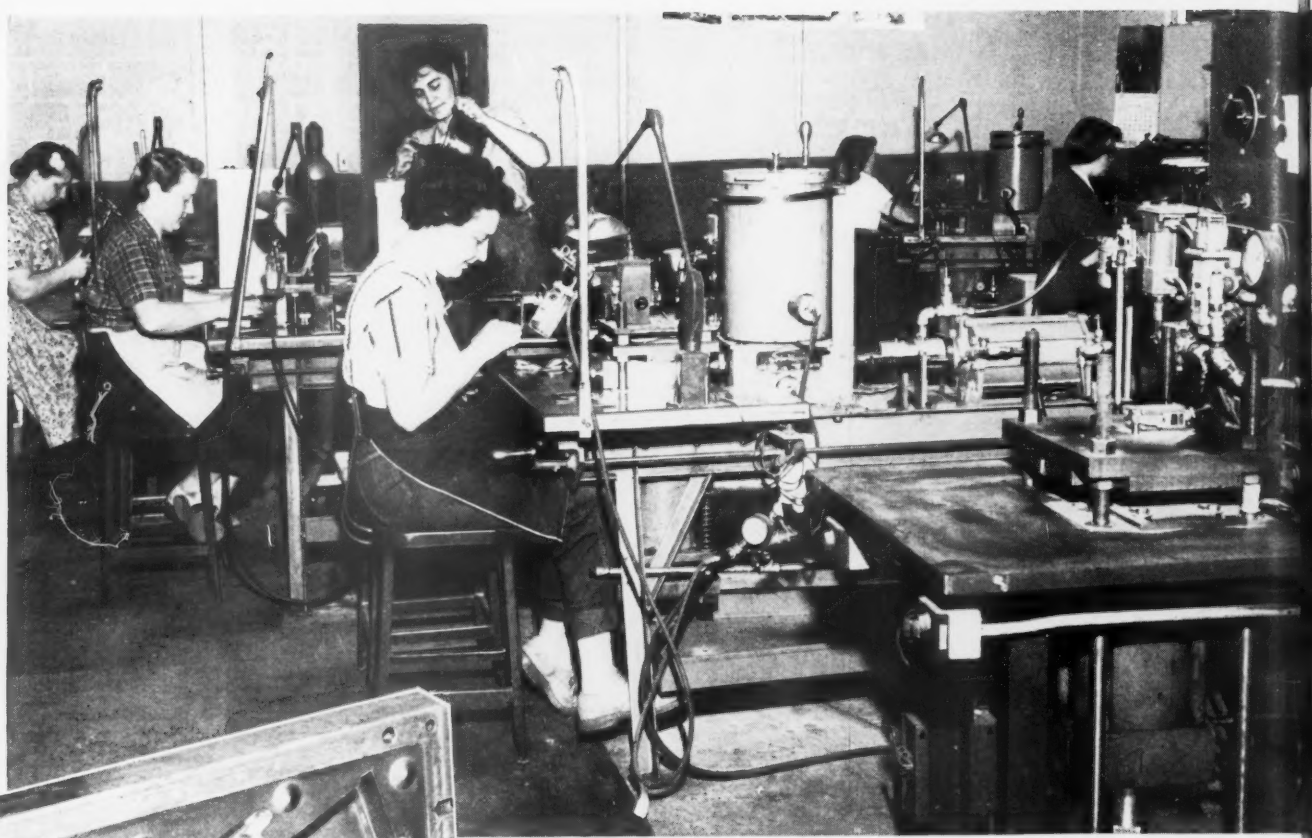


Fig. 2—Wax injection department. Molds are injected with wax at temperature of 155°F and at pressures varying from 500 to 1000 psi

Fig. 1—Injection mold used to produce a wax pattern at the new precision investment casting foundry of Michigan Steel Casting Co. The mold is cast in tin-bismuth alloy from a master brass pattern

New Precisio

Incorporates Specialized Equipment

By TED OPERHALL
Whitehall Precision Casting Division
Michigan Steel Casting Co.
Whitehall, Mich.

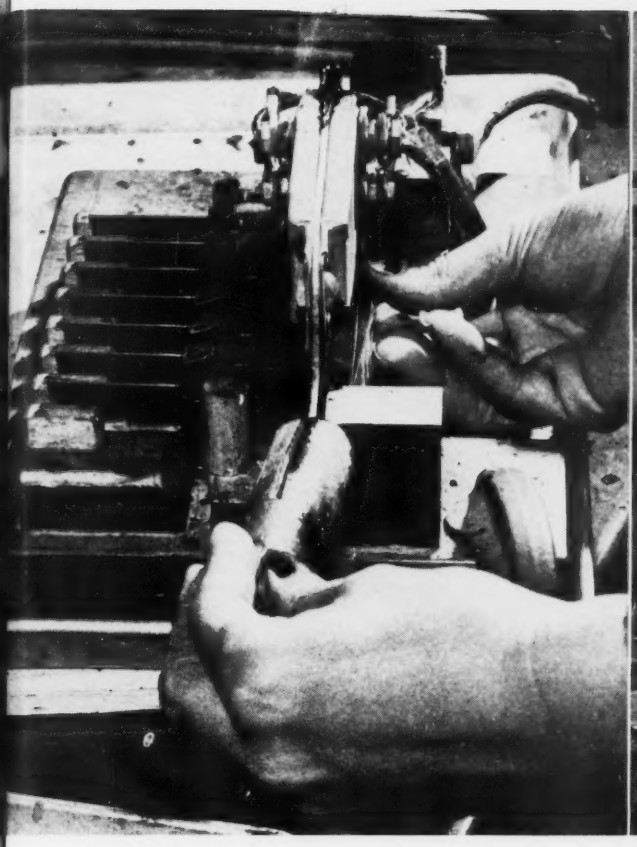


Fig. 3—Considerable skill and care are required in assembling wax patterns to gates and runners

Fig. 4—Dipping a pattern cluster into slurry of silica flour suspended in colloidal silica binder

Investment Foundry

MUCH HAS been written of the precision casting process in the last 8 to 10 years, of its methods, applications, advantages and economies over conventional methods of manufacture. The technical nature of the process requires a trained and competent staff, but more than this, it requires a plant which embodies the necessary specialized equipment related to the process.

On Sept. 29, 1952, the Michigan Steel Casting Co. held open house for its customers at the new Whitehall Precision Casting Division, Whitehall, Mich., and displayed its latest innovation in equipment and plant facilities. These facilities will permit Michigan Steel Casting to produce parts for industrial and aircraft fields in greater quantities and under closer control dimensionally and metallurgically than heretofore. The new plant represents eight years of concerted effort on the part of the company in its pursuance of the investment casting process. Considerable thought was given to plant layout and equipment requirements based on experience gained at the Detroit Division. We feel that this layout will make possible highly efficient operation.

Investment Casting—First, let us outline briefly the investment casting process, then discuss the various steps in some detail with respect to equipment and control measures being practiced at the Whitehall Division.

As in most foundry operations, we must start with a master pattern, which in all cases is a replica of the part to be produced and embodies process shrinkage of the wax pattern and the metal. Generally speaking, this shrinkage allowance is between .011 and .015-inch per linear inch. The material for the master pattern is usually brass because of its corrosion-resistance and machineability. This master is then cast in a tin-bismuth alloy to produce an injection mold.

Usual methods are employed to determine the parting line of the master pattern in a manner which will permit ease of retraction of the reproduced wax pattern. The mold is injected with wax at a temperature of 155° F with pressures varying from 500 to 1000 psi, depending on the intricacy and mass distribution of the part; after proper dwell time to solidify the wax, the cycle is complete. The pattern is retracted and inspected and is then ready for assembly to a cluster.

The assembly is performed by attaching the wax pattern to suitable gates and runners which will render the part x-ray sound after casting. This cluster next is dipcoated or precoated, which is accomplished by dipping into a slurry of 325 mesh silica flour suspended in a colloidal silica binder. After proper draining to eliminate "tear drops," it is "stucco-coated" with a coarse sand.

This operation is somewhat related to the conventional foundry process and might be considered a facing since it is this operation which reproduces on the ceramic dipcoat shell the intricate details existing on the wax pattern and originally on the metal master. After drying at room temperature for a period not exceeding 8 to 10 hours, the cluster is ready for flask mounting, which consists of attaching the sprue of the cluster to a bottom plate and encircling it with a special high alloy steel flask developed by Michigan Steel.

It is important that this flask be lined with water-resistant paper to permit filling beyond its normal height. In the next operation, referred to as the investing process, the material used is a composite of silica flour, sand and grog. It is bonded with ethyl silicate or colloidal silicate in conjunction with an accelerator in the dry investment. The dry blended investment is discharged into a wet blender, and the liquid binder is added at a ratio of 100cc per pound of investment and thoroughly mixed.

The assembled flask is placed on a vibrator and filled carefully. During the time it remains on the vibrator, the investment becomes closely packed around the dipcoated wax pattern cluster and forms a monolithic mold. The significance of the paper liner now becomes apparent, for a noticeable volume change has taken place. Liquid has come to the surface with the packing of the mold, and some grain-

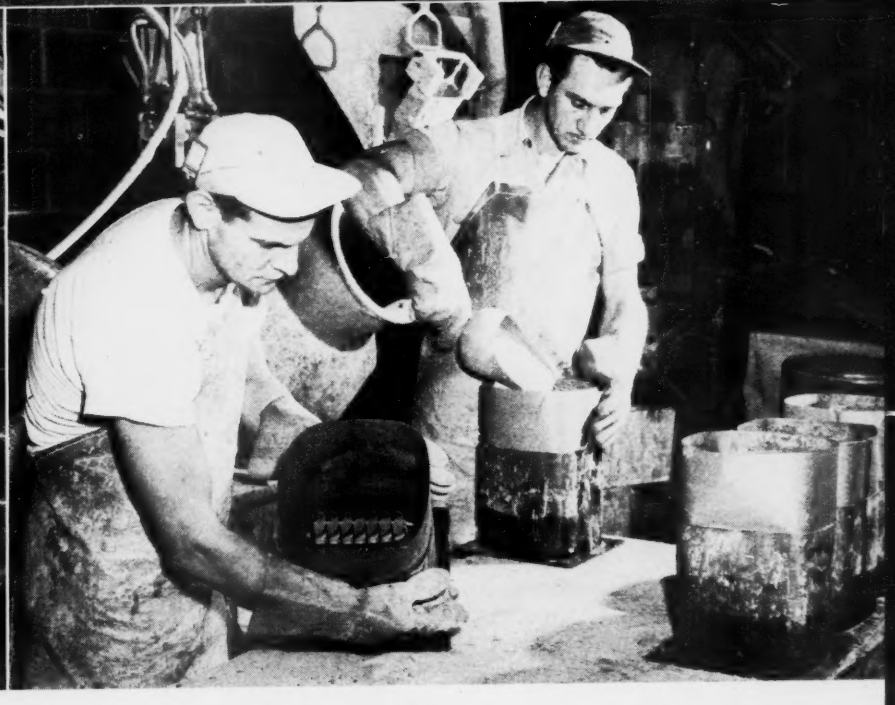
Fig. 5—Double-cone unit for blending the investment. About 30 minutes is required to blend a 2500-lb load

Fig. 6—After blending, a bucket elevator and belt conveyor transfer dry investment to holding bins in background

Fig. 7—Placing a flask over a pattern cluster after the sprue has been mounted to a bottom plate. High-alloy steel flask is lined with paper

ig. 8 (below)—Wet blend-ng is done in this mixer.

ig. 9 (below right)—In-estment material is add-d carefully to the flask



size segregation is noticeable above the top of the flask as the liquid is decanted. However, removal of the remaining excess of investment establishes uniformity at the flask level.

After the mold has air-set for 6 to 8 hours, the chemical reaction has taken place, and the mold is thoroughly hardened. Removal of the plate to which the cluster has been attached now exposes the mouth of the sprue.

During the next operation, commonly known as the dewaxing phase, the sprue mouth is the exit for the wax. Molds are placed on trays of a suitable truck, with the sprue mouth down, and the truck is rolled into an oven at a temperature of 205° F. During the next 12 to 16 hours the solvents used in the binder are volatilized, and approximately 80 per cent of the wax cluster melts and drains from within the mold. The balance of the wax is either absorbed into the investment or adheres to the faces of the surface of the cavities within the mold.

The dewaxed molds are now ready for the preheating phase of the operation. The mold sprue mouths are again placed on our high-alloy steel trays, and the trays are pushed by pneumatic rams through the continuous furnace on special high-alloy steel rollers developed by Michigan Steel. The temperature of this furnace varies from an entrance temperature of 375° F to a holding temperature at the discharge end of 1600-1900° F, again depending on both alloy and intricacy of the part.

During this cycle, which normally takes 10 to 12 hours, the mold is thoroughly heated, and the remaining traces of wax are entirely volatilized at the elevated temperatures. Additionally, heating the mold to these high temperatures permits filling of thin sections, which in many cases are as low as .012-in. on trailing edges of vane airfoils. Molds now thoroughly acclimated to the present temperatures are ready for casting.

The amount of remelt master metal shot melted is based proportionately on the specific gravity of the wax to the metal. It is charged into an indirect arc furnace and melted carefully to prevent overheating. Once the metal is molten, it is checked with an optical pyrometer for temperature. If it is at the required range, an asbestos ring gasket is placed over the throat of the furnace; the mold is withdrawn from the furnace and placed, sprue mouth down, in exact alignment with the throat of the furnace.

A suitable bar is placed on top of the mold, and, by action of a position-spring clamp, the mold is firmly attached to the furnace shell. The shell is then slowly inverted, and, at a point of 135 degrees of inversion, a cam engages an air valve, which permits air to pass through the electrode part and into the furnace crucible, forcing the molten metal into the mold cavity. This gives better fillout of very thin castings. The mold is then removed from the furnace shell and placed in a cooling hood, where the castings solidify.

Normal operations follow. The casting is removed by knock-out action of a pneumatic hammer, blasted for cleaning, cut off by either a friction saw or a rubber wheel, and then sent to the rough inspection

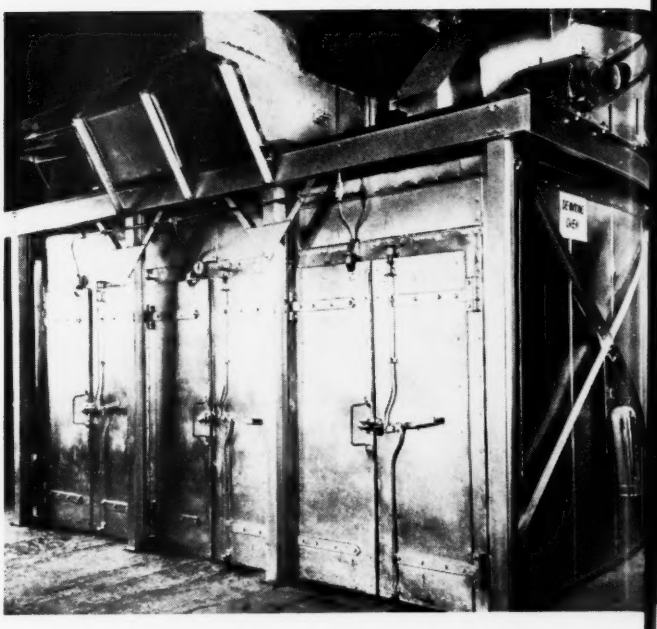


Fig. 10—Oven used to melt out wax from the molds. Molds are held here for 12 to 16 hours at 205°F

Fig. 13 (below)—Shakeout station where castings are separated from investment material by pneumatic hammer. Spent investment falls through the floor and is removed from building by a conveyor

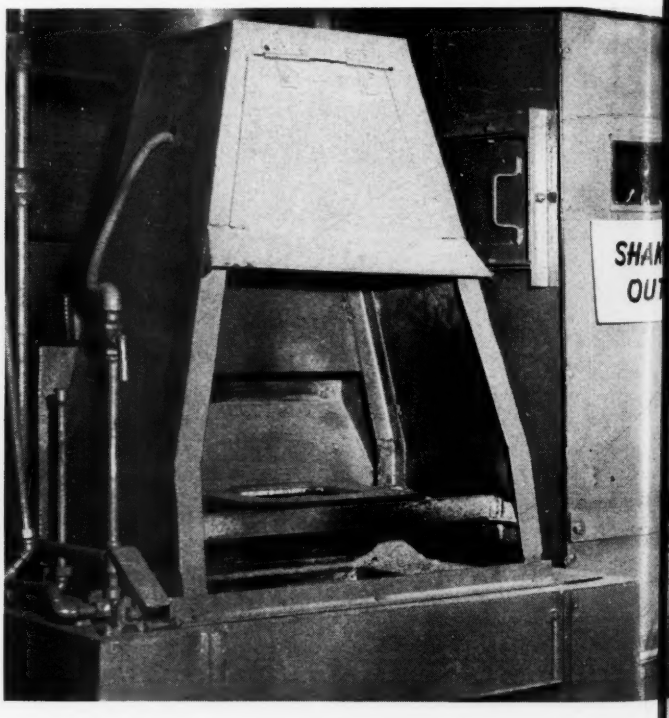
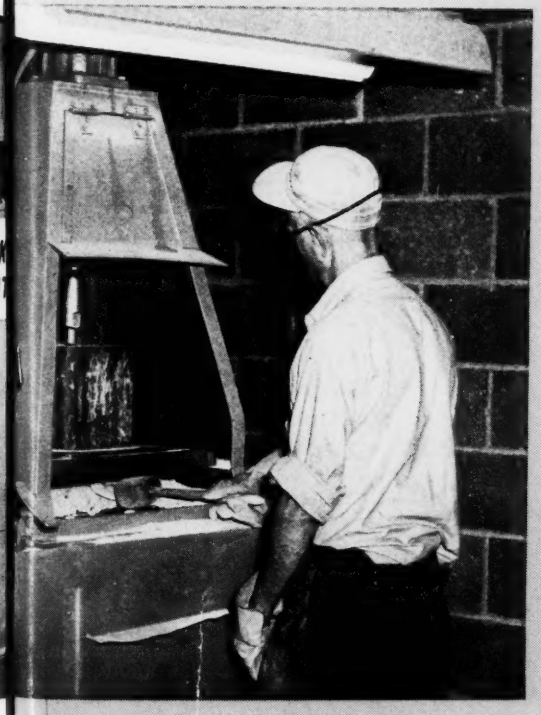


Fig. 11—Molds entering continuous pre-heating furnace, pushed by pneumatic ram

Fig. 12—Removing molds after 10 to 12 hours in furnace. In this time remaining wax volatilizes

Fig. 14 (right)—Mold clamped to top of indirect electric arc melting furnace. When the assembly is inverted, air pressure forces molten metal into mold cavity



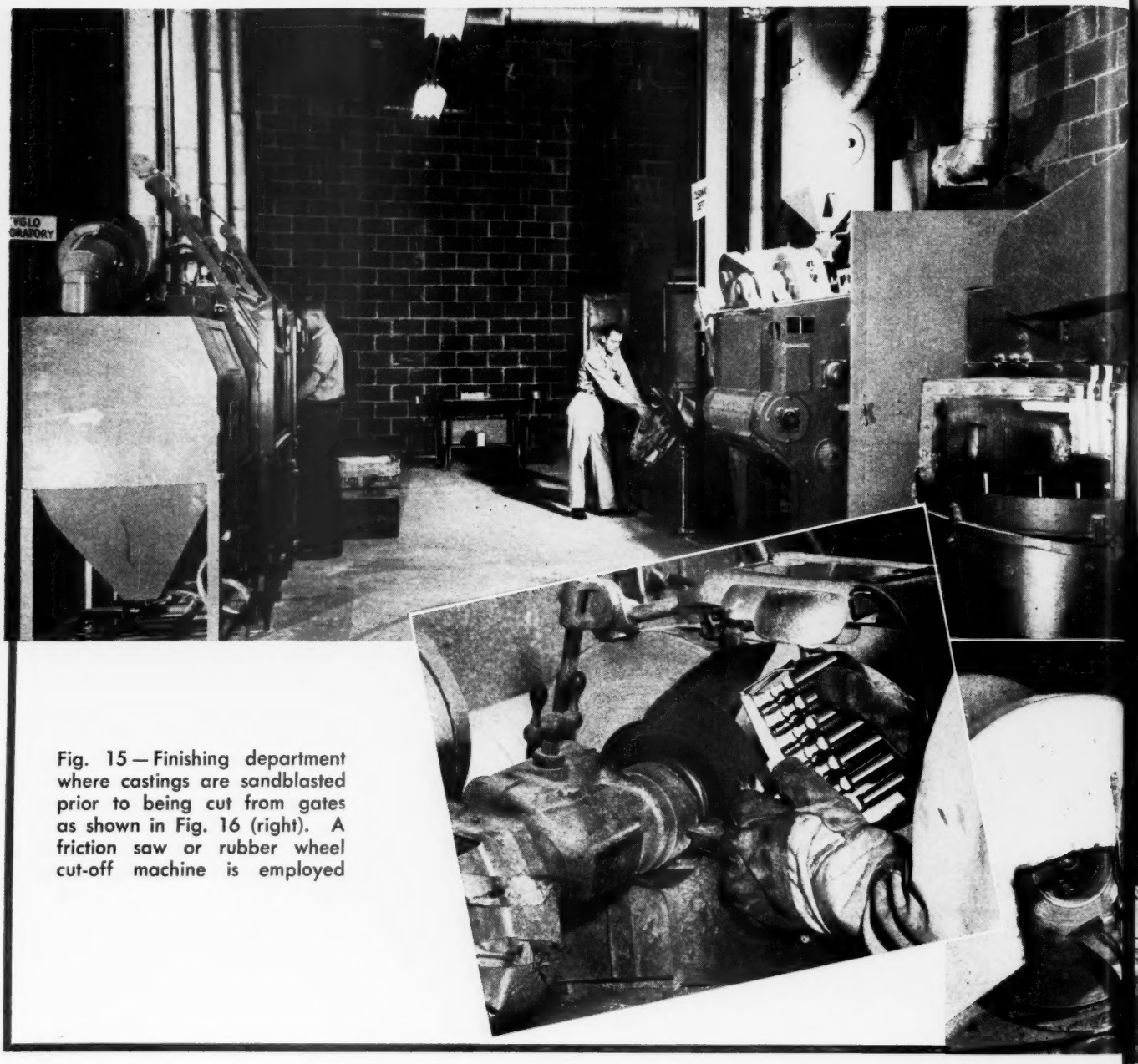


Fig. 15 — Finishing department where castings are sandblasted prior to being cut from gates as shown in Fig. 16 (right). A friction saw or rubber wheel cut-off machine is employed

department. Castings found acceptable are routed to the finishing department, where the gates are removed by grinding. Surface blemishes, resulting from bubbles in the dipcoat or inclusions of a minor nature, are removed by belt-sanding or mounted-point grinders.

Castings processed in this department pass to x-ray and Zyglo inspection for acceptance, are given a final sandblast, and sent into final inspection. The shipping department then, by electro-etching for aircraft parts, assigns the heat number from the traveler, along with information on test results performed on the casting, and shows its acceptance.

Problems and Controls—This resume of the process appears to be quite simple. If it does not appear to have the problems of other methods, let us now consider process controls and equipment and the problems which can result from insufficient amounts of both.

Master Pattern—Every dimension on the master pattern must correspond to the master pattern drawing and be completely inspected prior to its release to the mold department. For this purpose we have provided adequate room, with equipment capable of inspection on all but the most difficult airfoil master patterns.

The mold-making department depends greatly on the skill of trained personnel since the mold must produce a pattern free from warpage, undercuts, stripper pins and shrinkage cavitation. Here we feel we excel, with the able assistance of our foreman, who is capable of utilizing the new equipment in our tool and die room.

Wax Injection—In the wax injection department (Fig. 2), problems can result from improperly blended wax, air entrapment, too short a dwell time for wax solidification, excessive warpage and other conditions.

The wax injection equipment was designed to yield a pattern free of such defects by the installation of electronic temperature control equipment in critical

points of the injection machine. Additionally, constant agitation is used to eliminate variation in wax temperatures at various points in the reservoir. The process control department is called upon to test each batch of wax for melting-point hardness and shrinkage characteristics.

Wax Assembly—The wax assembly department is greatly dependent on foreman-training and the skills of the employees (Fig. 3). Utmost care must be exercised to prevent wax from dripping onto patterns. Clusters must be assembled to drain properly, be gated securely, and have joints sealed so that they are free of cavities. The original gating setup is established by the metallurgist and the project engineer in conjunction with the foreman, and is fully evaluated in all respects before it is released for production. Designing fixtures for rapid assembly is the function of the assembly foreman and the engineering department and constitutes an important part of their work.

Dipcoating—The dipcoat operation (Fig. 7), is an extremely important phase of this process. At our plant the preparation of the dipcoat is a function of the process control department. Its blending is carried on with great care. Before it is released for production, a viscosity check is made with a paint cup, and the dipcoat slurry is adjusted to the desired viscosity for the work that is scheduled to be precoated that day.

Additionally, the covering qualities and freedom from air are checked visually with a glass slide. The manner in which the wax cluster is dipped also is important. Undercuts, sharp corners and flat surfaces are prone to trap air, and unless the cluster is plunged and moved while fully submerged to break or release this air, a (*Please turn to page* 172)

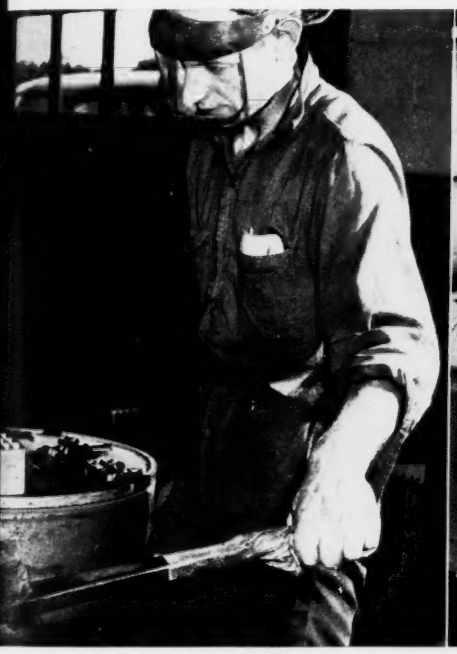


Fig. 17—Grinding operation in the finishing department to remove gate stubs from castings

Fig. 18—Belt-sanding of castings is procedure used for removing minor surface imperfections

Fig. 19—Extensive laboratory facilities help maintain quality of raw materials and products

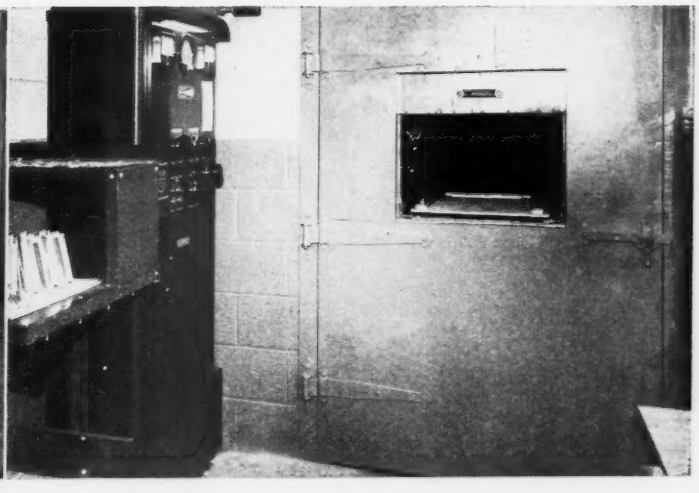


Fig. 20—X-ray and Zyglo equipment are important tools employed for inspection of castings

CASTING DESIGN

For Heavily Loaded Parts

How to design a casting to meet stresses it experiences in service is discussed in this talk given before the 1952 conference of the University Advisory Committee of the Foundry Educational Foundation

By E. T. VINCENT
Chairman
Department of Mechanical and Industrial Engineering
University of Michigan, Ann Arbor, Mich.

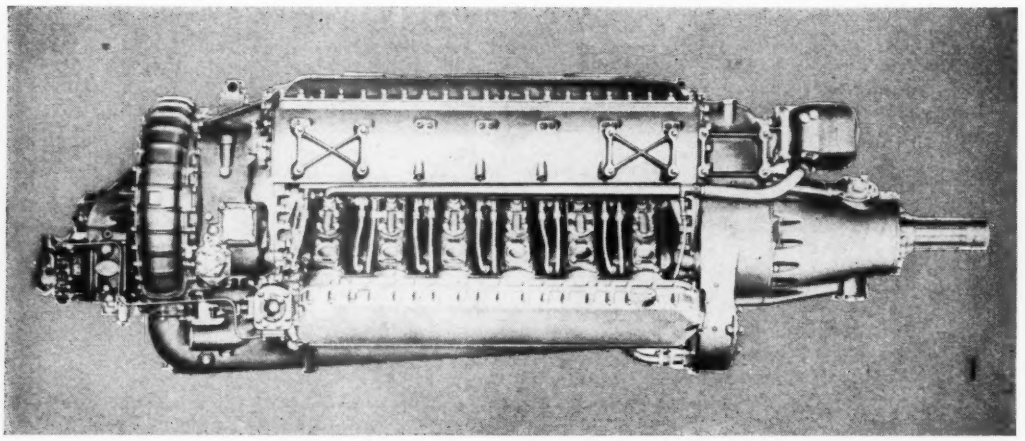


Fig. 1—This inverted V-type water-cooled engine develops 2500 horsepower, weighs only 1450 lb.

Fig. 2—Interrelation of design, material and processing

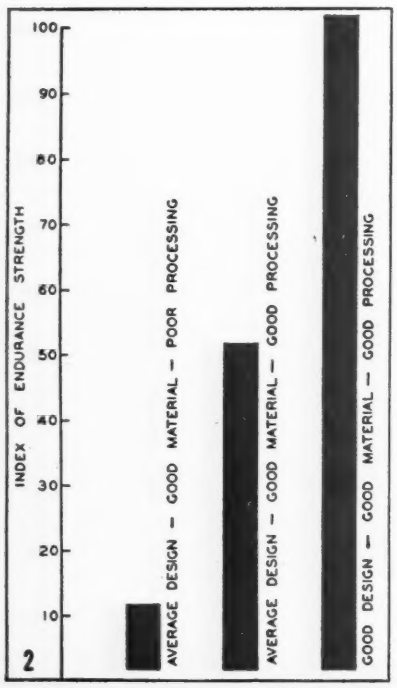
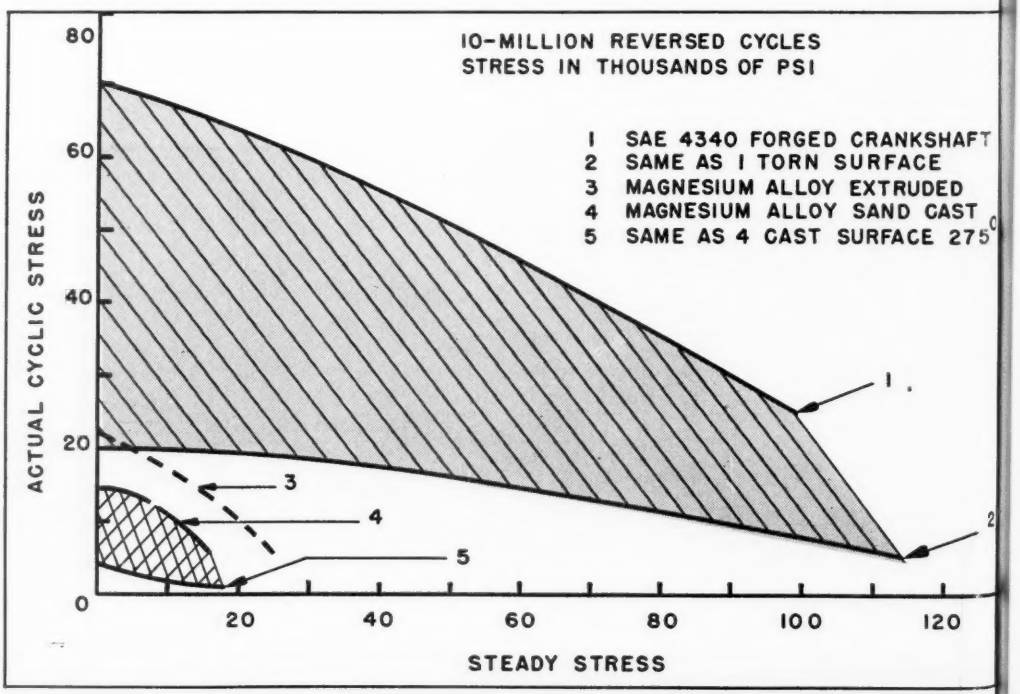


Fig. 3—Allowable stress range for certain materials



THE DESIGNER interested in the production of heavily loaded parts must keep in mind certain fundamentals that are in general easily complied with. He must start with the stresses that actually occur in castings; the techniques to calculate them and to relate them to the final article are not particularly new. The main difficulty really arises from the complication of the article and the need to approximate some accurate method of stress analysis.

Within limits, it is not the stress in a part that matters; it is the *range of stress* the part goes through during any given cycle. By increasing the stress in a part, the designer often can make it last two or three times as long as it would with a lower stress. For example, the higher the stress in an automobile valve spring, within limits, the longer it lasts. Such springs are designed with a margin of safety of probably about 10 to 20 per cent. If a safety factor of 2 is employed, it breaks in short order.

When a range of stress exists from tension to compression or from tensile to tensile, the maximum stress can be increased considerably without any difficulty. Parts have actually worked to within about 10 per cent of the actual yield point of the material with perfect safety and plenty of life. Peak stress doesn't bother the designer by itself. The main thing to consider is the range of stress in operation.

I do not mean the stress that we calculate, but the actual stress that exists in the part. It is that which causes success or failure. Thus the important part of any analysis is the determination of the relationship between the stress we calculate and the actual stress that is going to exist in the part. Some pretty good guesses can be made in certain types of applications.

To begin with, let us examine the idea of fatigue in parts as a result of stress fluctuation. The best approach is to have a look at a rather simplified fatigue diagram, such as the regular Goodman type of diagram shown in Fig. 4, in which is plotted a mean stress that can exist for any range of stress.

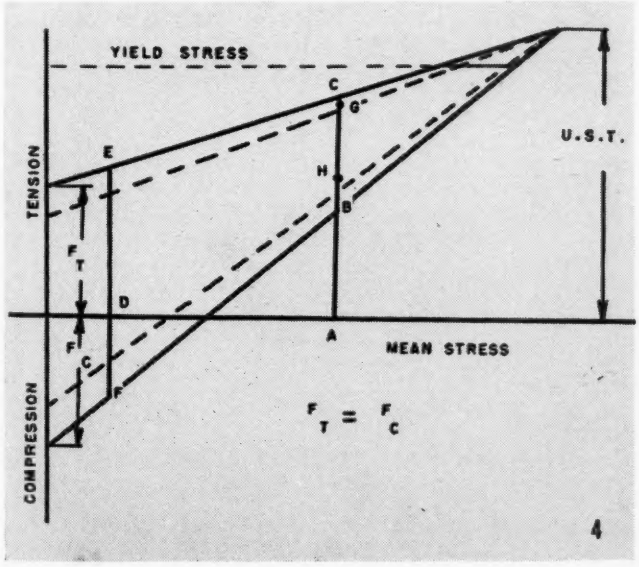


Fig. 4—Fatigue diagram. This is obtained by joining points representing the maximum tensile and compressive stresses with the ultimate tensile strength

If a part is subjected to reverse fatigue from some maximum tensile to some maximum compressive stress, failure can occur in a certain number of cycles. Thus two points are obtained which represent the reverse fatigue limit. If these two points are joined to the ultimate tensile strength of the material as in Fig. 4, we have a rough fatigue diagram. In practice the boundaries are not straight lines, but they will suffice for our particular purpose. This diagram tells us that if we have a certain mean stress represented by *A* in Fig. 4, the working stress can go through the range from *B* to *C*. At low mean value such as *D*, the stress can go from *E* tensile to *F* compressive.

If it is possible to determine the actual stresses in a part accurately enough, no safety factor is needed; and if those actual stresses are just inside the confines of the diagram, as *G* and *H* are, by as little as 10 per cent, that part will last as long as necessary. The safety factor becomes the ratio of *CB* to *GH*, 10 per cent or whatever is desired.

There is one particular difficulty so far—that is, the fatigue varies with the surface finish on the part. If

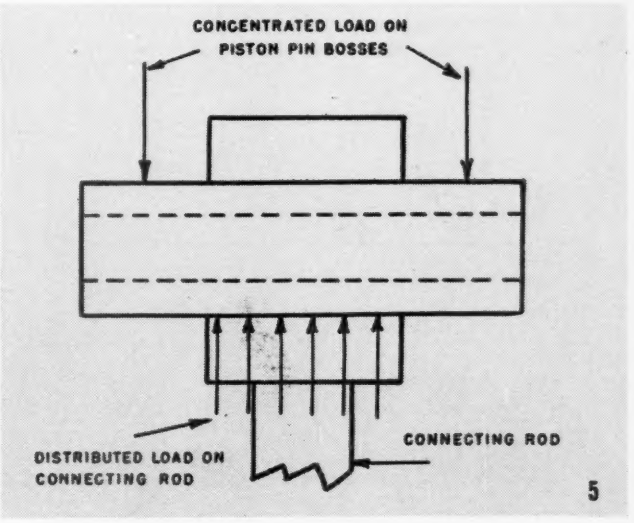


Fig. 5—Illustrating distribution of loading on a wrist pin for an internal combustion engine

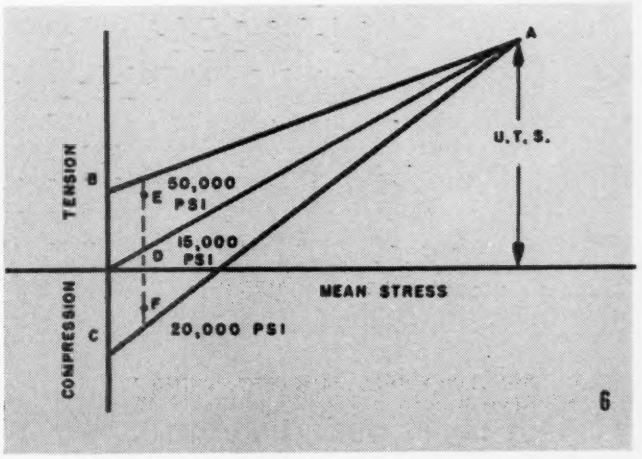


Fig. 6—Fatigue diagram for a wrist pin. Actual stresses fall within the limits of the material

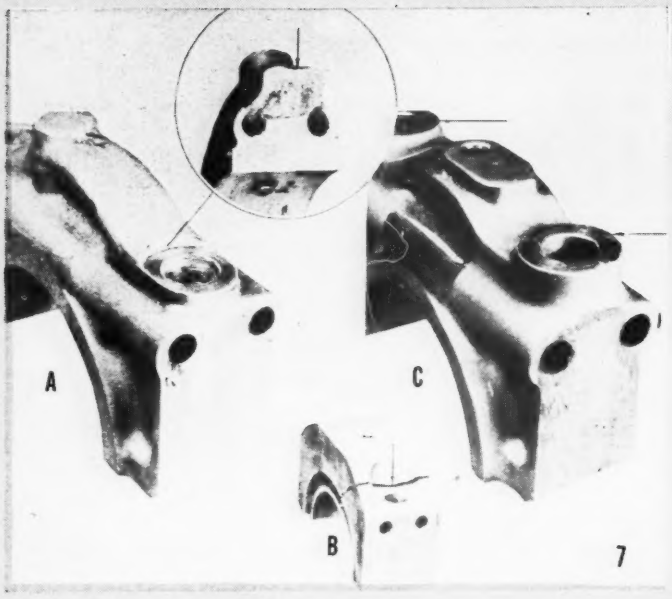
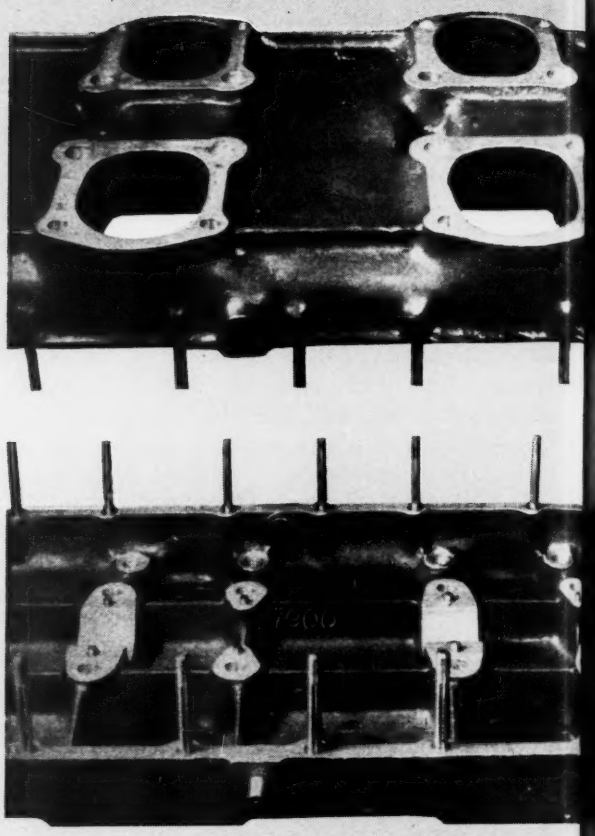


Fig. 7—Bearing cap. Originally a forging as shown at *B*, design was changed to a casting *(A)*. This also broke. Study of stress flow resulted in the successful design shown at C



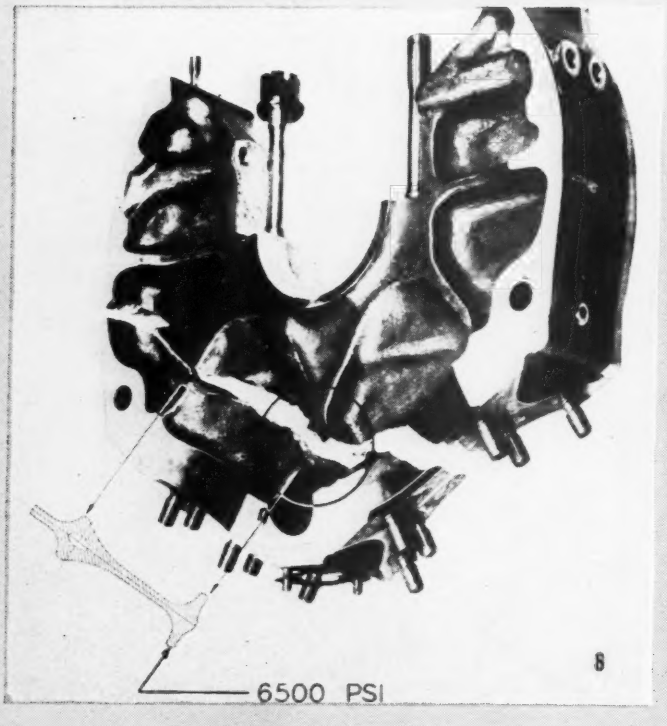


Fig. 8—Engine crankcase as designed originally had heavy sections and numerous ribs. Maximum stress was calculated at 6500 psi

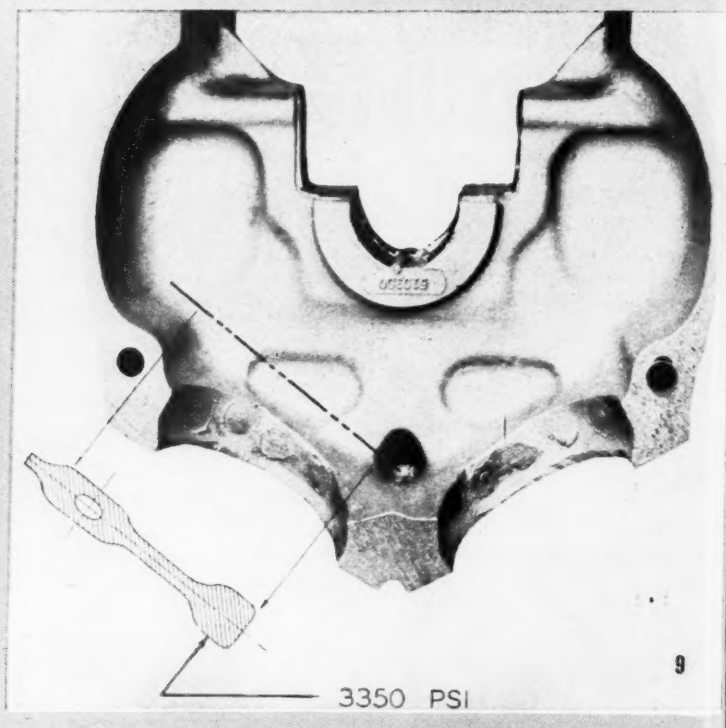
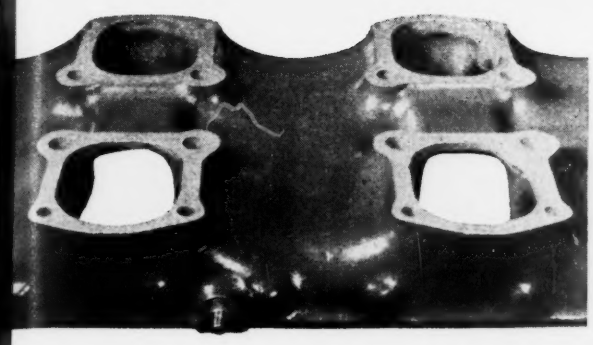
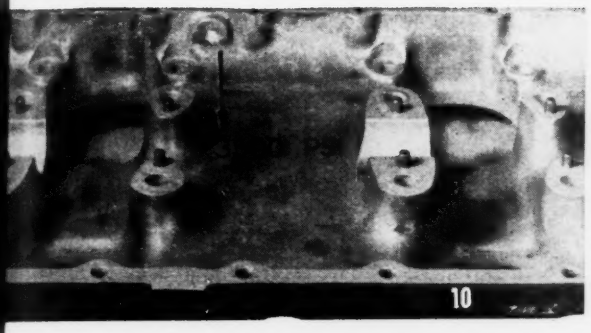


Fig. 9—Modification of the crankcase design eliminated deep ribs, used thinner walls, but maximum stress was reduced to 3350 psi





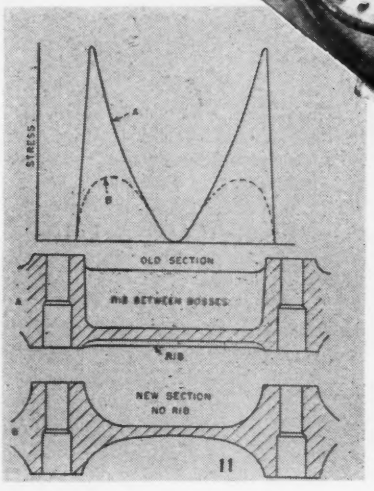


Fig. 10—Changing original design (left) of the engine rocker box cover to that shown at right reduced maximum stress from 7900 psi to 3500 psi, and also cut the weight. Fig. 11—Stress distribution for the two different designs

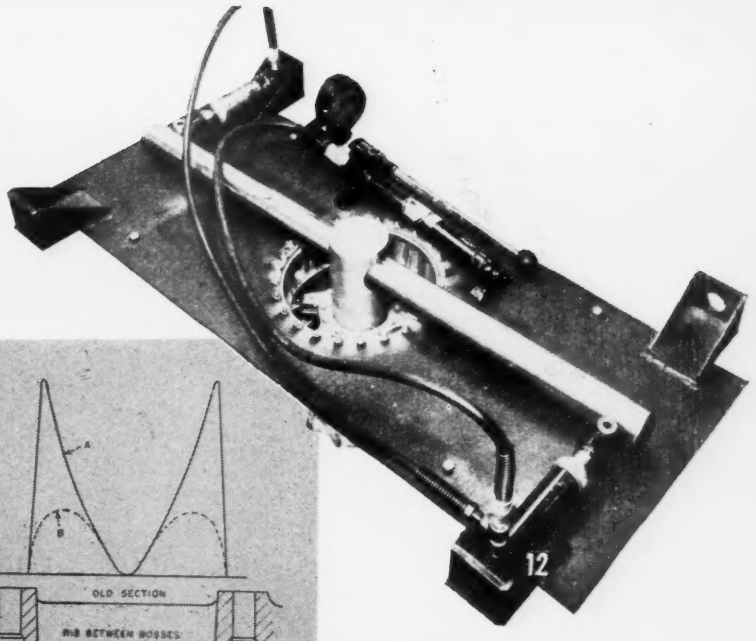


Fig. 12—Method of applying torque to a casting to disclose, by means of brittle lacquer, the zones of stress concentration. This is one technique for testing such high loaded parts

the part is produced with the best surface finish possible, the stress range varies as a maximum. With imperfect surface finish, the range is reduced as shown by the dotted lines in Fig. 4, the magnitude of the reduction of stress range increasing with the degree of surface roughness. It follows that the problem of surface finish must be included in the picture in order to obtain the correct range of stress that is permissible.

Working out the formula for a design, one makes certain assumptions. These will include some regarding the material of which the part is to be made. In general, if it follows Hook's law, a material is considered to be elastic. Actually, the material doesn't know about this assumption and has its own ideas about what is going to happen to it under stress. In other words, there are errors in the theory to begin with.

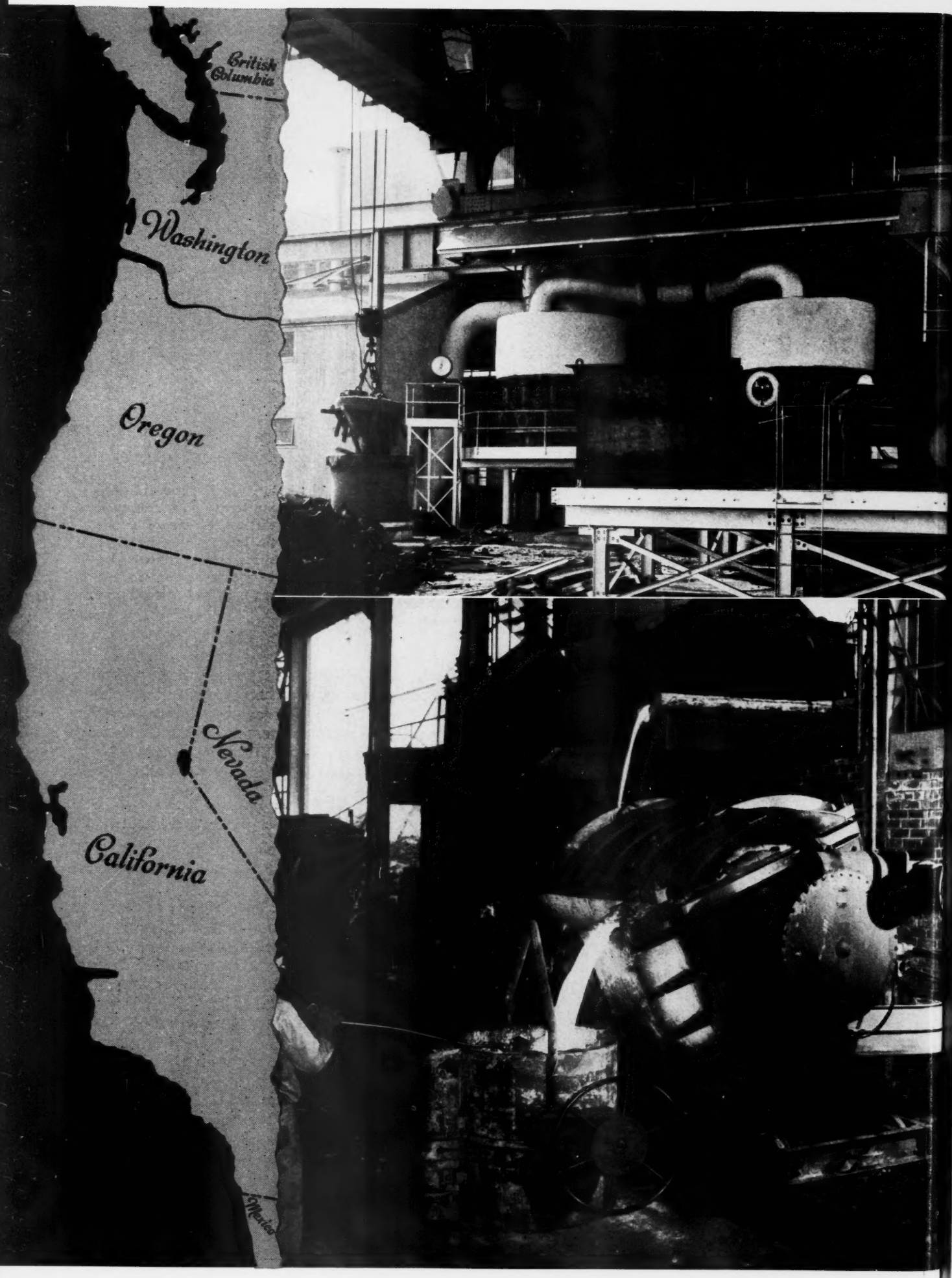
Secondly, in the development of a formula it is necessary to make other assumptions when the formula permits the calculation of certain stresses. Before applying the formula, designers usually make further assumptions regarding the manner in which the part being analyzed is loaded.

All things considered, it is clear that the calculated stress bears little resemblance to the actual stress, and the idea of a safety factor arises. If a safety factor of 4 is employed, for example, with this method of calculation, the part really may have a safety factor of only 10 per cent. It is considered to be 4 because it has been calculated as 4, but the actual stress may be 390 per cent greater than that calculated, so that a 10 per cent safety factor actually exists. With lightweight engine designs, the real safety factor is what counts, not the 4 to 1. If the 4 to 1 safety factor did exist, the engine would be far too heavy to do its job. It is necessary, therefore, to do all that is possible to determine the actual stress in the part.

The most important thing is to increase our knowledge regarding fatigue of all sorts of materials, to increase our knowledge regarding the actual stress concentrations that occur in certain types of designs, to increase our knowledge of how loading is applied to parts and to interpret from some calculation what the actual stress in the part will be.

As mentioned earlier, some parts, such as springs, can be calculated with a high order of accuracy. As a result it is possible to predict their life. If a valve spring with a life of around 50 million cycles is desired, it is possible to design one quite closely. In certain instances, the fatigue problem is fairly well established. Unfortunately, in the foundry industry the techniques of calculating stresses, stress ranges and other pertinent questions have not been developed to the extent that is desirable. Consequently, other techniques must be employed.

It is much cheaper to calculate and to draw than it is to produce a complicated part and try it out. The tendency, therefore, should be toward greater detailed analysis of stress distribution and actual stress measurement in operation than (*Please turn to page* 267)


British Columbia
Washington
Oregon
Nevada
California
Mexico

New Pressure Pipe Foundry

Serves West Coast Area

Fig. 1 (top left)—Charging bucket is being loaded with a predetermined accurately weighed amount of pig iron. Dial of the scale is easily visible to operator of the crane

Fig. 2 (bottom left)—The upper stream of iron is flowing from the cupola to a large U-ladle. Lower stream is flowing from U-ladle to a small transfer ladle simultaneously

Fig. 3 (above)—After the bucket has been charged, the loading crane picks it up and moves it into the charging zone, close to the top of the cupola

CAST iron pressure pipe centrifugally cast in metal molds was first produced commercially on the Pacific coast when the California plant of the United States Pipe & Foundry Co. began operations at Decoto in November, 1951. Plant layout and equipment incorporate the latest features proved in service in the company's other plants and new ones developed in pilot plant operations. Straight-line flow of production prevails from receipt of raw materials to shipment of finished products. The plant employs about 100 men.

Two 96-in. cupolas lined to about 72 in. provide molten metal. The cupolas are equipped with hot blast to preheat the air to 450°F in a heat exchanger. Iron at 2600°F flows continuously from the cupola into a desulphurizing basin and then into a covered, tilting, 12-ton U-ladle. This ladle pours into transfer ladles which serve the casting machine ladles.

Two core blowers make the head or bell cores required to form the inside contour of the bell. This core is made on a metal core ring which fits into the bell end of the mold.

Each casting machine incorporates a metal mold encased in a water box on which is mounted a motor to drive the mold. Water box and mold are mounted on wheels running on a slightly inclined track about 40 ft long. At the upper end are a machine ladle, a chute, a trough and a spray lance about 18 ft long. Trough and spray lance can be shifted laterally.

Casting cycle starts when the mold is at the lower end, the trough is in pouring position, and the machine operator has just placed a head core in the bell end of the mold. He then starts the mold revolving, and the mold assembly begins to travel toward the ladle end. As the mold nears the ladle end, the machine ladle starts to tilt. Iron runs through the trough into the bell end of the mold just after the mold assembly has reached the end of its

upward travel. When the operator sees iron flowing into the mold, he presses a button to make the mold travel away from the ladle end as the iron flows into the spinning mold and forms the pipe.

When the casting operation is complete, the carriage is at the lower end. The mold continues to rotate until the pipe has cooled sufficiently. The operator then removes the core ring and inserts a pipe puller anchored to a puller block. During this operation, the troughman shifts the trough to the side for cleaning, placing the spray lance in line with the mold axis. The carriage travels toward the ladle end, and the pipe is extracted from the mold as it travels upward until it rolls out to the side on the hot pipe skids.

After the pipe is extracted, a blast of air through the mold removes excess coating, and a wet refractory spray is applied from the spray lance as the carriage is returned to the operator's end. At this point the troughman shifts the cleaned trough back into pouring position, and the mold is ready for the next cycle.

A crane picks up the hot pipe from the skids and places it on skids in front of the heat treating furnace. The hot pipe is calipered and weighed before entering the furnace. Close temperature control is provided in the furnace as the pipe travels slowly through it.

A hydrostatic test press in the production line tests each length of pipe at 500 psi, considerably beyond normal working pressure.

Centrifugal force also is employed to apply a smooth cement mortar lining to the inside of the pipe. Mortar is fed into the pipe through a lance equipped with a screw conveyor. This assembly is mounted on wheels and runs on a track. At one end of the track, a double spinner spins two lengths of pipe simultaneously. Pipes are aligned on the spinner to center with the lances on the machine. Cement mortar is extruded and troweled on the inside of the spinning pipe by the lances as the machine moves along the track and the lances travel the full length of the pipe and return.

After a short spin on the lining rollers, the pipes are rolled onto another spinner and spun for about a minute. They then are moved to another spinner, where they receive a second rapid spin. After both rapid spins, the pipes are tilted at the bell end and flushed out with water.

In the next step, the pipes are rolled into a heated curing tunnel after a rubber cap has been placed on each end. As the pipe moves through this tunnel, the cement lining is cured to a degree equivalent to a 24-hr wet cure. Finally, seal coat is applied to the lining, and the outside of the pipe is coated.

Coatings are applied mechanically. A length of pipe is placed on a special car and rotated on rollers while the car travels on a track. As the pipe moves, a radial-head spray lance coats the lining, and a fixed nozzle applies the outside coating.

Fig. 4—Core blowers which make head cores are at left. Cores in rack will soon go into drying oven

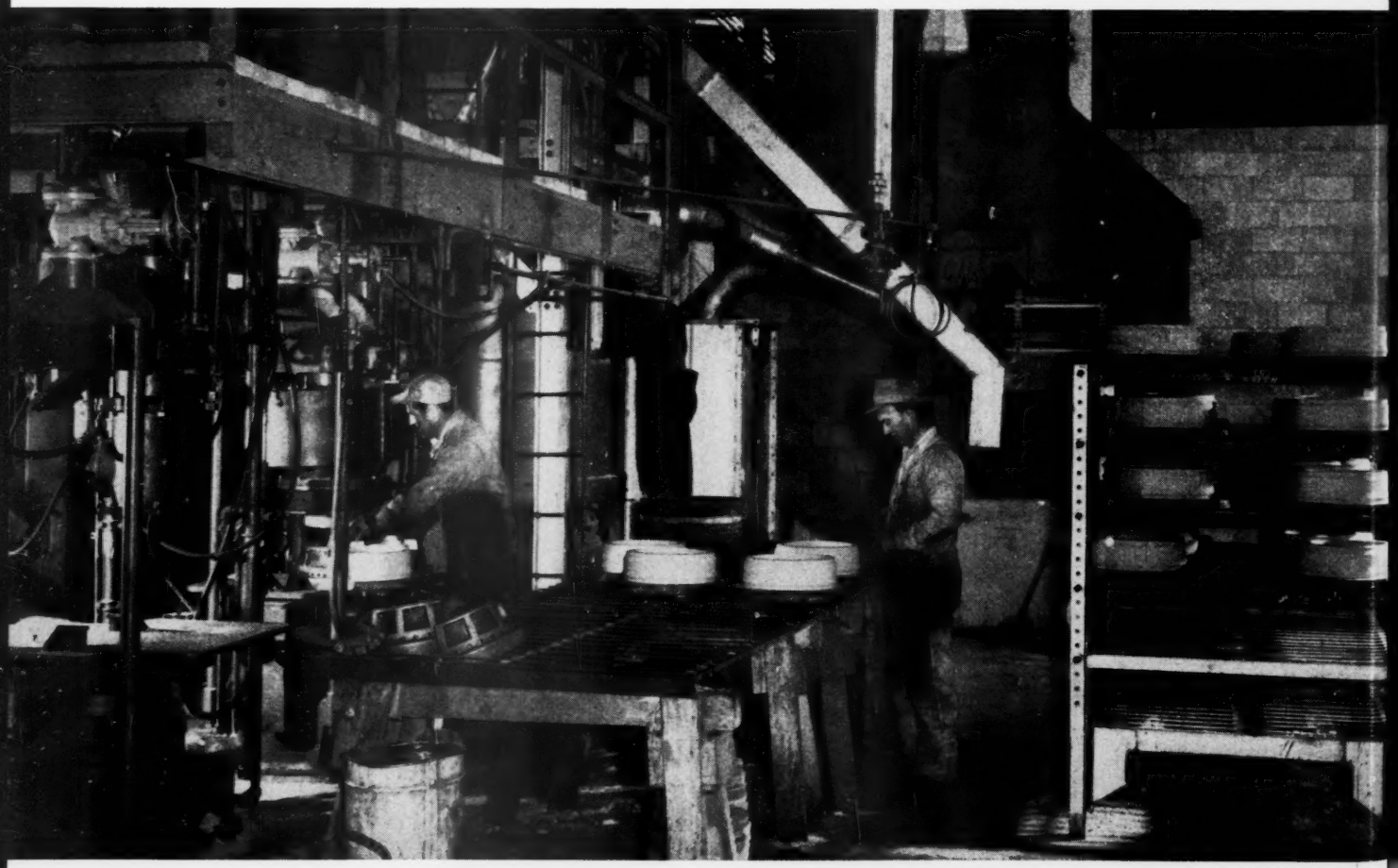
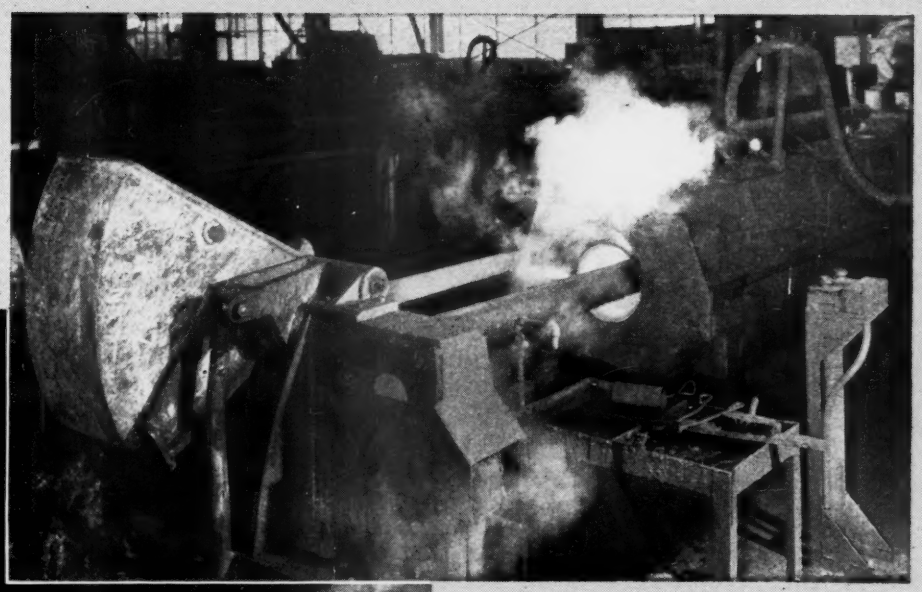


Fig. 5 (right)—This view of a casting machine from the ladle end shows it during the early stages of the casting cycle



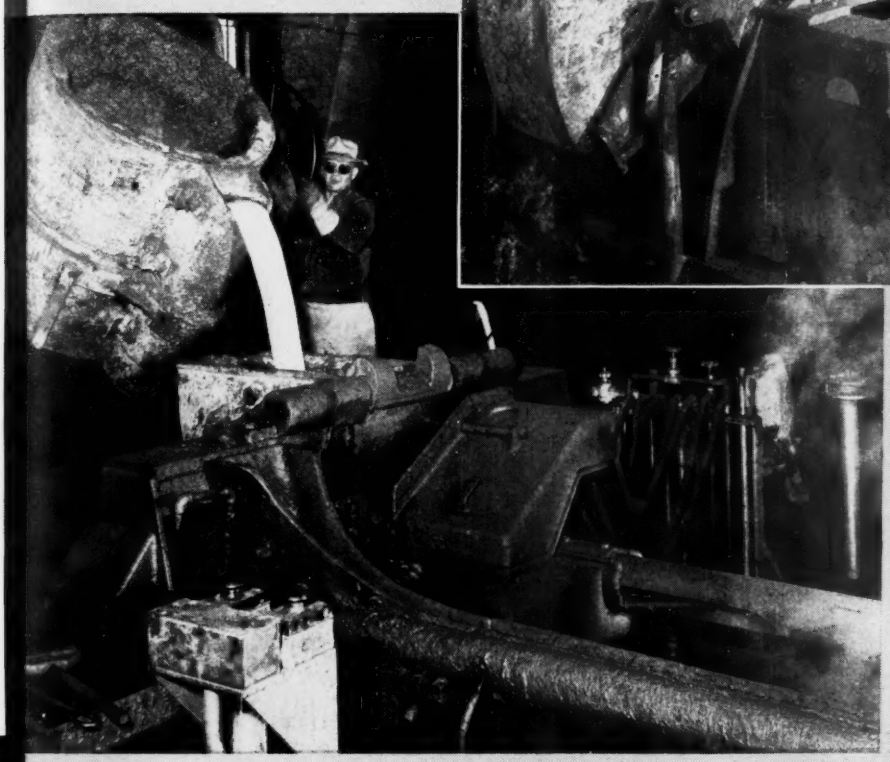
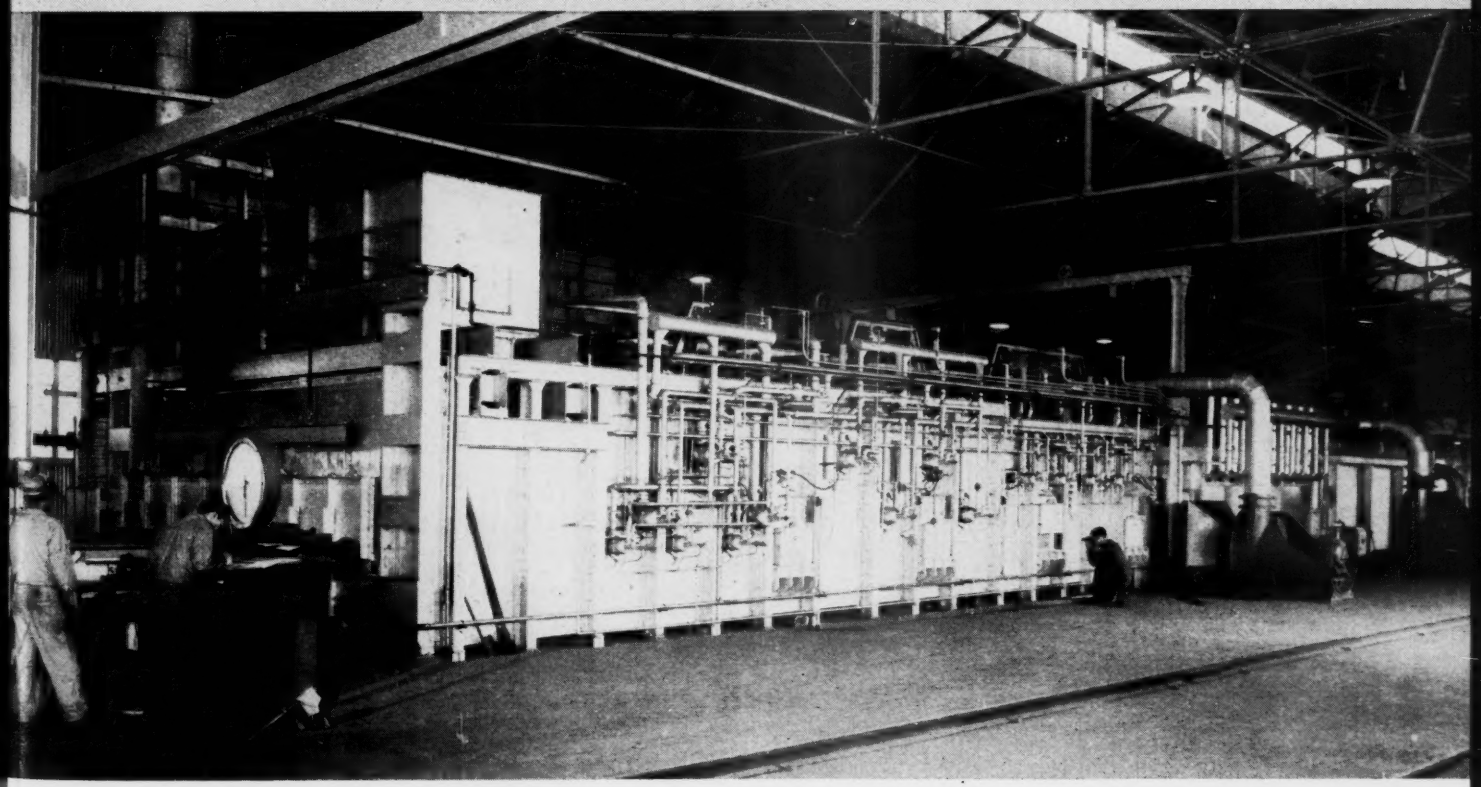


Fig. 6 (left)—Transfer ladle is lifted by the hot-iron crane and moved to casting machine, where sufficient iron is poured into machine ladle to cast one pipe

Fig. 7 (below)—View of heat treating furnace shows the entrance and one side. Scale in foreground is used to check weight of each pipe before it enters furnace



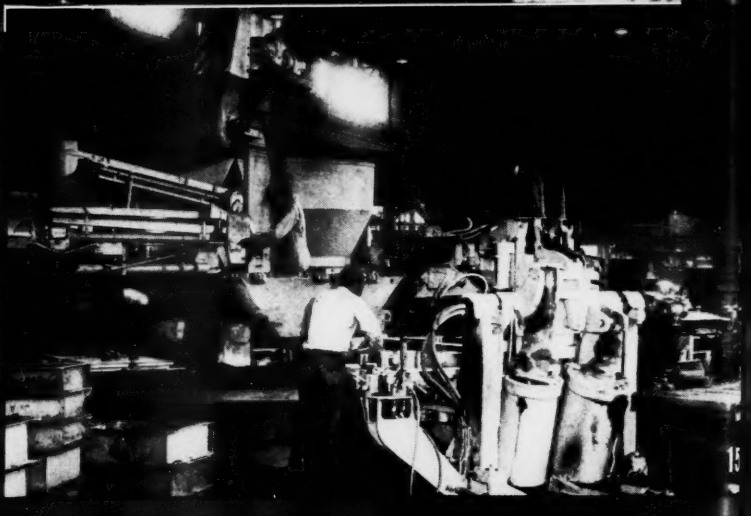
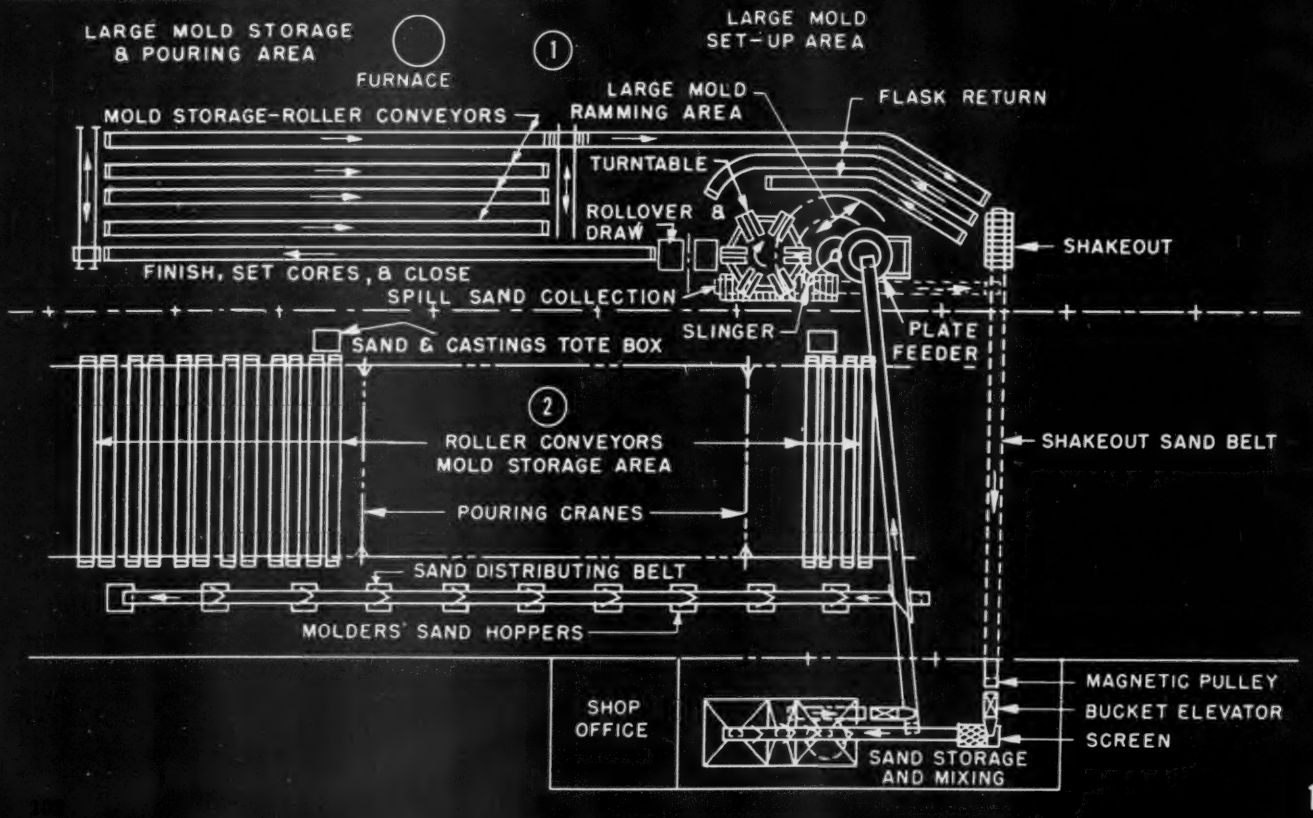


Fig. 14 (above)—Four-station unit is similar to ideal foundry's six-station unit, but this slinger is manually controlled

Fig. 15 (right)—Each molding station requires one rollover-draw machine. Larger molds could be handled on rollover like the smaller, from above-floor turntable

Fig. 16 (below)—An hydraulic sandslinger rams large molds on six-station turntable. Sand falls from overhead plate-type feeder



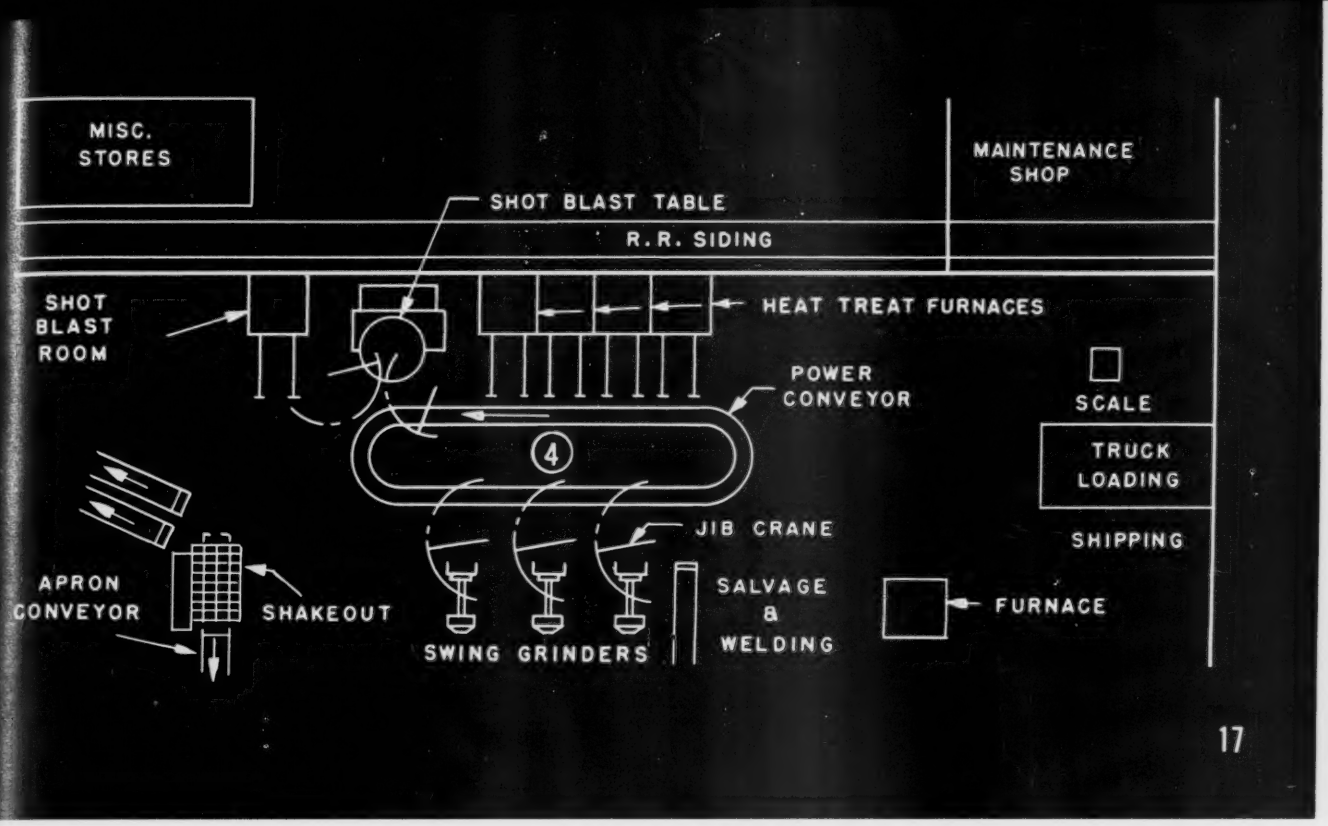


Fig. 17—Power conveyor speeds large casting handling in cleaning room. Overhead jib cranes move castings between conveyor and work stations

The "Ideal" Steel Jobbing Foundry

This second and concluding article details the additional steps that are desirable in modernizing a typical steel jobbing foundry. Facilities required to achieve the most efficient operations are described

By HARRY G. SCHLICHTER
Vice President and Sales Manager
Beardsley & Piper
Division, Pettibone Mulliken Corp., Chicago

WITH small mold production and small casting cleaning modernized and expanded, large mold production should be given consideration. Although the extension of the mulled sand belt and the location of the shakeout in the large mold bay (shown in Fig 3 last month) have greatly improved conditions there, the capacity of the department is far too low, and the work is not carried on efficiently. It will be recalled that 16 molders worked in this bay and made molds for approximately 3 tons of finished castings each day. The poured casting weight varied from 80 to 4000 lb, the capacity of the furnace.

It is desired at least to double the capacity in this molding bay and at the same time retain full flexibility so that a wide range of jobbing patterns can be handled effectively. At the same time, any mechanized equipment should, of course, make use of the extended mulled sand belt and the location of the shakeout.

The proposed large mold production unit, shown in Fig. 16, will be a relatively simple one. An hydraulically-controlled slinger will ram molds on a six-station turntable. The slinger will be provided with sand by an overhead plate-type feeder served by the existing sand belt. There will be no molding machines on the turntable, but instead pattern and flask equipment will be located for ramming on short roller conveyor sections on the table. The table will index one-sixth of a turn on each rotation, and the conveyor sections on the table will align successively with the roll-in conveyor of a rollover draw molding machine (Fig. 15). Thus, one rollover draw machine serves all six stations.

Although the unit shown in Fig. 14 does not include an automatic strike-off, such a strike-off could easily be provided since standardized flasks will be used. With automatic strike-off, three men can easily handle all operations at the molding table. One man operates the slinger from a remote station by hydraulic con-

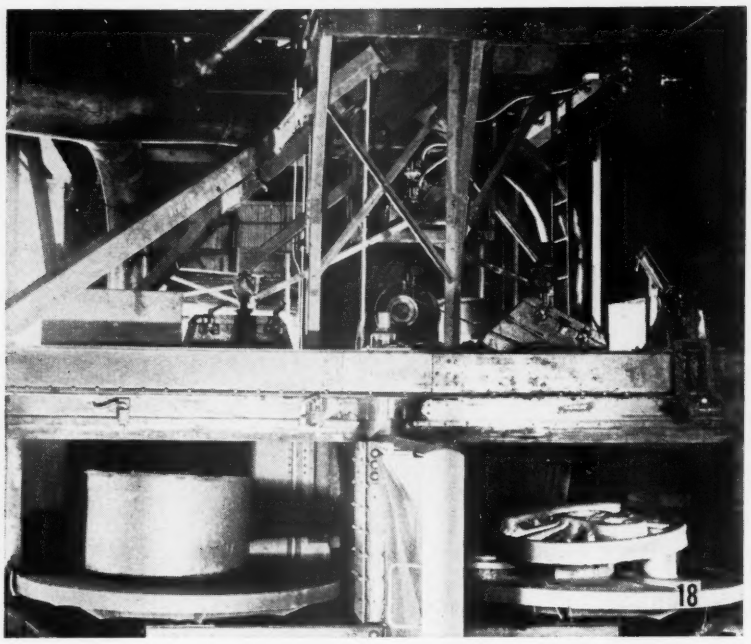


Fig. 18—Airless blast table for the cleaning room. Large number of very large castings may require a shot blast room

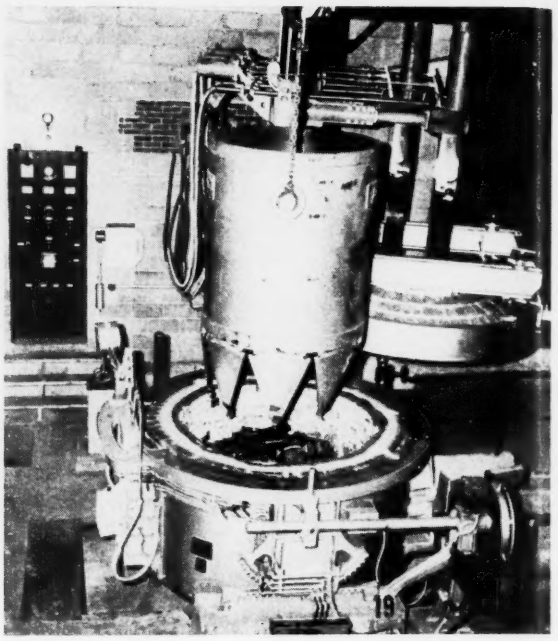


Fig. 19—Simple top charging setup costs little, eliminates troublesome operations

Fig. 20—Metal is tapped from the furnace directly into large transfer ladles. This metal will be transferred to smaller ladles for pouring

trol; a second man operates the rollover draw machine; and a third man places flasks on the pattern with an overhead air or electric hoist and also helps with the rollover draw operation.

All major pieces of equipment in such an installation are located in a very small area. It is possible to complete installation while molding continues in the rest of the bay. Production is not hampered while the plate feeder, slinger, turntable, and rollover machine are installed. Then, when the unit is ready to go into full operation, the various roller conveyors can be installed over a week-end. This is in line with modern plant mechanization practice, in which production is held at a relatively stable level as installation of new equipment proceeds.

On the new unit, pattern changes will be made with ease. One pattern simply will be rolled off the turntable and another pattern rolled into position in its place. Patterns will be mounted on standard pattern boards with angle sections mounted on their underside to dovetail with other angle sections mounted at each turntable station. These will hold the pattern firmly in place as the mold moves beneath the automatic strike-off.

Standard size 36 x 42-in. flasks will be used on the unit to simplify pattern and job changes. Other advantages will be derived from standard flasks, including the use of standard flask clamps and the simplification of mold pouring. When 36 x 42-in. standard size flasks are used, molds for castings weighing up to 200 lb can be handled on the turntable. Larger molds will be rammed on the floor to the right of the turntable and be handled by crane, which will also serve the large mold setup area.

All molds will be skin-dried through the use of a special, inflammable spray. This drying will be completed on the long roller conveyor section which leads from the rollover draw machine. Mold finishing and core setting will also take place on this conveyor before the molds are moved by transfer car to one of the pouring and storage conveyors. The provision for several pouring conveyors will provide the same flexibility which was obtained on the small mold unit and will permit the separation of molds according to metal composition.

In addition to the three men working at the molding turntable, nine additional men will be required for core setting, finishing and other operations on the unit. With 12 men on the unit, approximately 170 of the 36 x 42-in. molds will be produced each day. These will average 75 lb in finished casting weight for a total of 6½ tons of finished castings. Four additional men will work on large molds, about 12 of which will be rammed-up and finished each day. Their average finished casting weight will be approximately 400 lb, so that between 8 and 9 tons of finished castings will be produced daily, approximately tripling our previous tonnage on this floor.

To triple production without any mechanization would require at least 15 additional men. Our mechanization has thus permitted a saving of up to $45,000 a year in labor alone and will pay its relatively small cost of $70,000 in about two years. This short period is made possible by the relatively low cost of the unit as compared to a six station heavy molding unit of another type. Our provision for future planning at the time the small mold unit was installed is also very helpful, since in the installation of this large mold unit, full advantage can be taken of the existing shakeout and sand system.

With large mold production approximately tripled, added facilities will be necessary for the cleaning of large castings. Again the problem is not so much one of process as it is handling. The prime mover in the large casting cleaning department, shown in Fig. 17, is a loop power conveyor which transports the castings between the various stations. At each work station, overhead jib cranes greatly ease the job of moving the castings from the power conveyor to the working positions. The large castings are delivered by crane from the shakeout to a shot blast room or an airless shot blast table depending upon their size. Since the same shakeout is used for both small and large molds, they will have to be shaken out alter-

Fig. 21—Proper sand storage and delivery aid coreroom operations

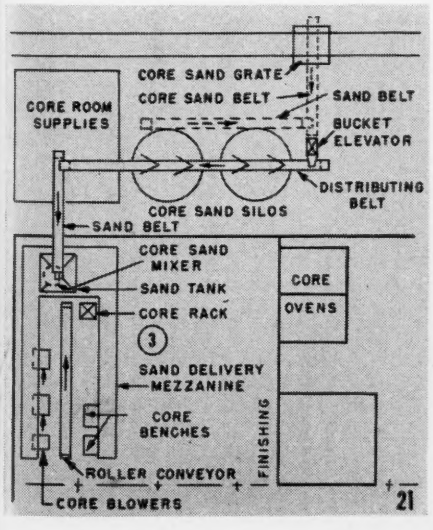
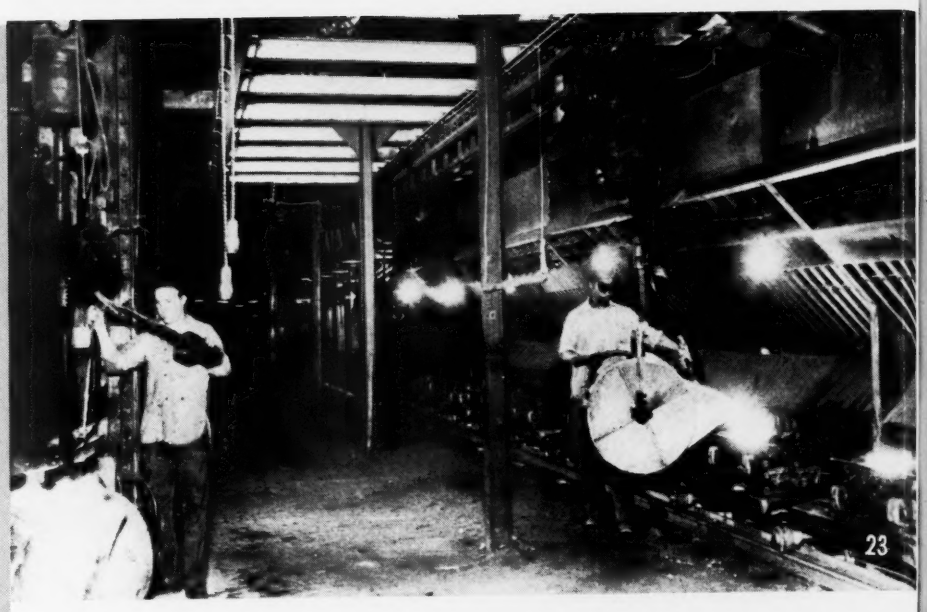


Fig. 22—Silo sand storage installation at right with provision for under-car unloading could be applied to the "ideal" steel foundry

Fig. 23—The pouring zone can be effectively hooded for removal of fumes. Improved working conditions make the task of the men doing the pouring easier



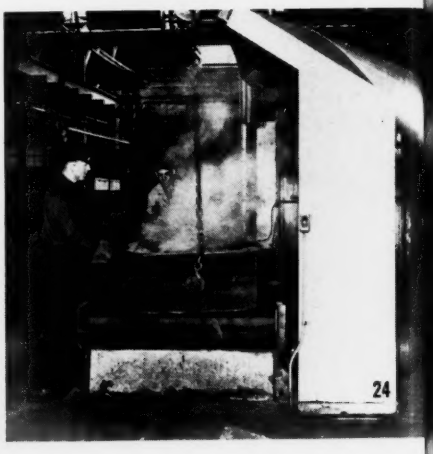
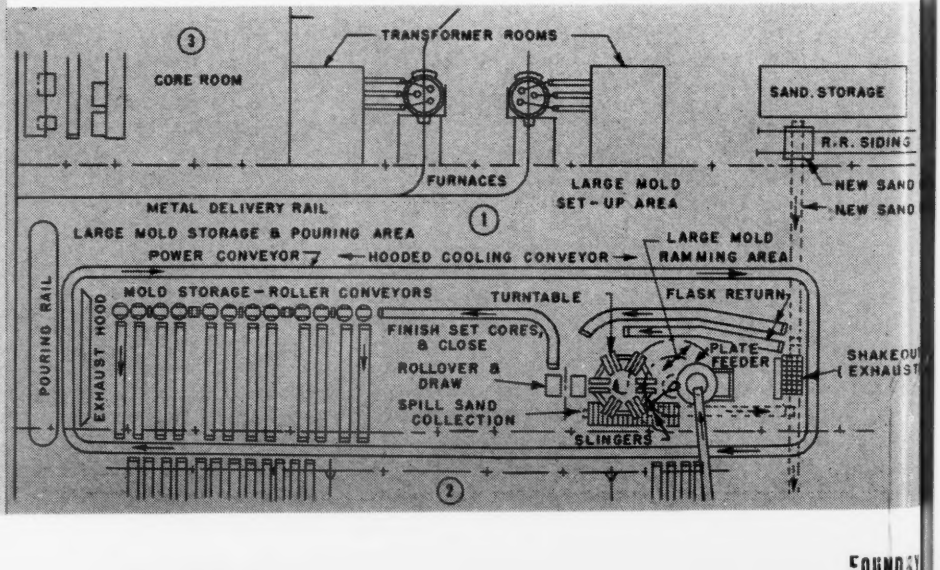


Fig. 24—Shakeout should be hooded for effective air control, but full crane access to shakeout is vital in handling large castings

Fig. 25 (above)—Transfer setup pushes molds stored on one conveyor to other. Series of conveyors permits separation according to metal composition

Fig. 26 (right) — Roller conveyor which minimizes mold transfer movements facilitates efficiency



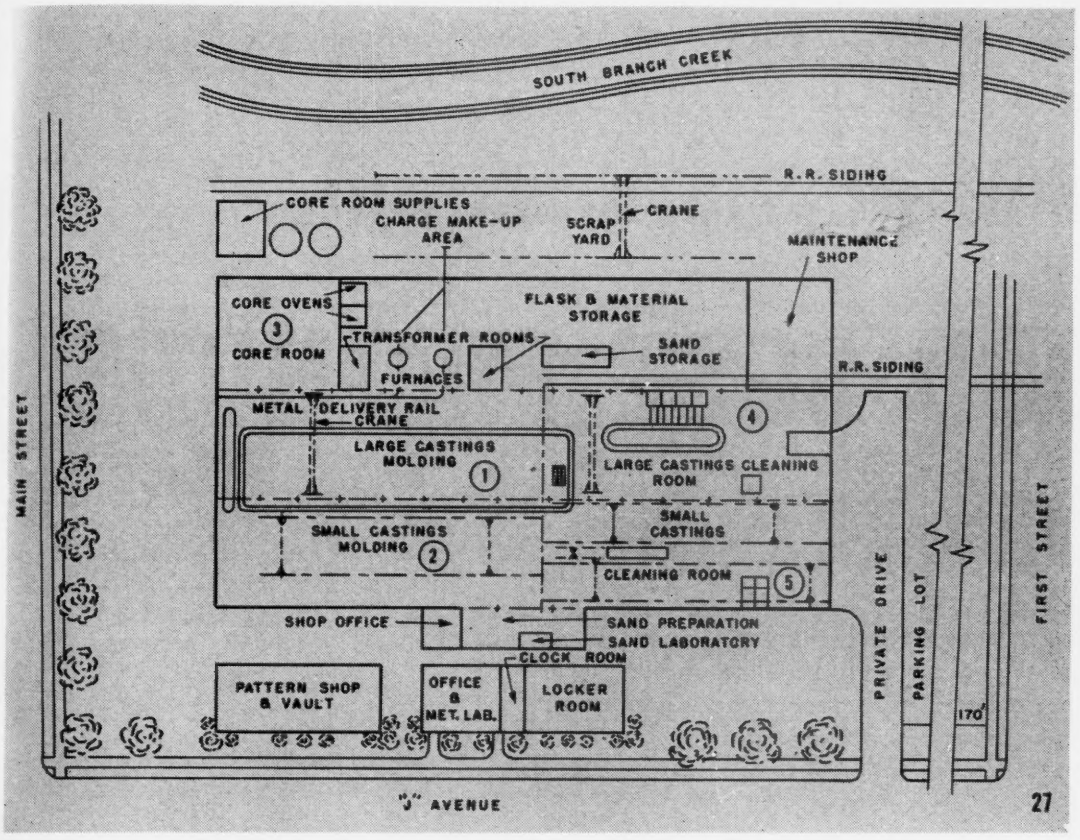


Fig. 27—Final form of "ideal" steel jobbing foundry shows division of area to various activities. There's room for more improvement, but much has been done

nately, and a shakeout crew of two men can handle the job.

Heat treating will be followed by recleaning the castings in an airless shot blast table unit similar to that shown in Fig. 18. The loop power conveyor, together with the overhead cranes and the jib cranes, will provide ample flexibility for any handling necessary in this department. Even where castings must be reblasted several times in their passage through the cleaning department, handling will offer no difficulty.

If the old cleaning room merely had been expanded without any modern equipment or planned mechanization, at least 18 additional men would have been necessary to handle the tripled production of large castings. With careful planning and modern equipment, the job can be done in this cleaning room with only a third this number of additional men.

Thus, there is a saving of 12 men and, despite the high cost of mechanization, the equipment will pay for itself in less than four years. This investment-return period not only takes into account the cost of all of the equipment, including the power conveyor —about $105,000—but also the cost of extending the building to provide the cleaning room area—that is, approximately $50,000.

Melting Capacity Doubled—During our expansion of the molding, coreroom and cleaning departments, the melting capacity has fallen far behind that required for efficient operation. It has been necessary to operate the 2-ton furnace for approximately 16 hours to provide enough metal for pouring all of the castings. This double-shift operation and the clumsy yard charging operation seriously hamper the production of our ideal steel foundry. The next step in our mechanization program should be to improve metal practice.

To provide ample melting capacity during a single-shift operation, a second 2-ton furnace will be installed. The existing 2-ton furnace is moved out of the main molding bay into a new building constructed for the purpose. This new building will also include provision for inside sand, material and flask storage and will bring our foundry much closer to an ideal layout.

Not only will an appreciable labor saving be realized by eliminating the night shift and providing an efficient charging system, but conditions in the foundry will be greatly improved by moving the melting furnace out of the molding area. This will also provide more room for molding. The installation of a yard crane to serve the railroad siding, the charge make-up area and the charging scales will permit a three-man crew to handle the entire charging operation. The installation of a charging monorail with drop-bottom buckets for charging not only will simplify the job, but will permit much more accurate control of the metals charged into the furnaces.

Every steel foundry knows that new furnace capacity is expensive, but in this foundry it was made essential by a large increase in foundry capacity. Because new furnace capacity is expensive, the cost of this latest step in our mechanization program will be high —approximately $150,000. (*Please turn to page* 257)

Meeting Competition with

GOOD COST METHODS

How to proceed in actual calculation of job costs and selling prices is detailed in this second of two articles. The author also warns against certain unreliable practices which can lead to erroneous cost estimates in figuring casting prices

By ALBERT E. GROVER
Cost Consultant
Cleveland

EVERY foundryman should be interested in any procedure that will permit the calculation of costs by which sales policies are determined with a minimum of paper work and without the sacrifice of accuracy. The preparation and use of tables will do just that, provided the tables are so arranged that they show these factors:

1. Cost per pound of metals of different mixtures.
2. Cost per pound to melt metals, with a separate sheet for each mixture.
3. Cost per hour for forming cores at different levels of operator hourly wage rates.
4. Cost per piece for corebaking, at different normal loads and by different types and sizes of baking ovens.
5. Cost per hour for molding at different levels of operator hourly wage rates.
6. Cost per hour for shaking out castings at different levels of operator hourly rates.
7. Cost per piece for barrel cleaning at different normal loads and by different types and sizes of barrels.
8. Cost per hour for hand cleaning at different levels of operator hourly wage rate.

Sample forms are shown in Fig. 6. These forms are 5 x 3 in. with ribbon punching on the 3-in. side, for use in multiple-ring books. Properly indexed, these tables provide for ready reference when cost estimates of individual jobs are being prepared.

These books are such a convenient size that they can be carried in the pocket.

Calculating Job Costs and Selling Prices—Preparing the estimate, the estimator first indicates the customer's name, date of the estimate, pattern number, description of the casting, number of molds, pieces per mold, pieces to be made, type and size of pattern and size of flask to be used. A suggested form is shown in Fig. 6. Costs, profit and estimated selling price are then determined as follows:

Metals—Indicate:

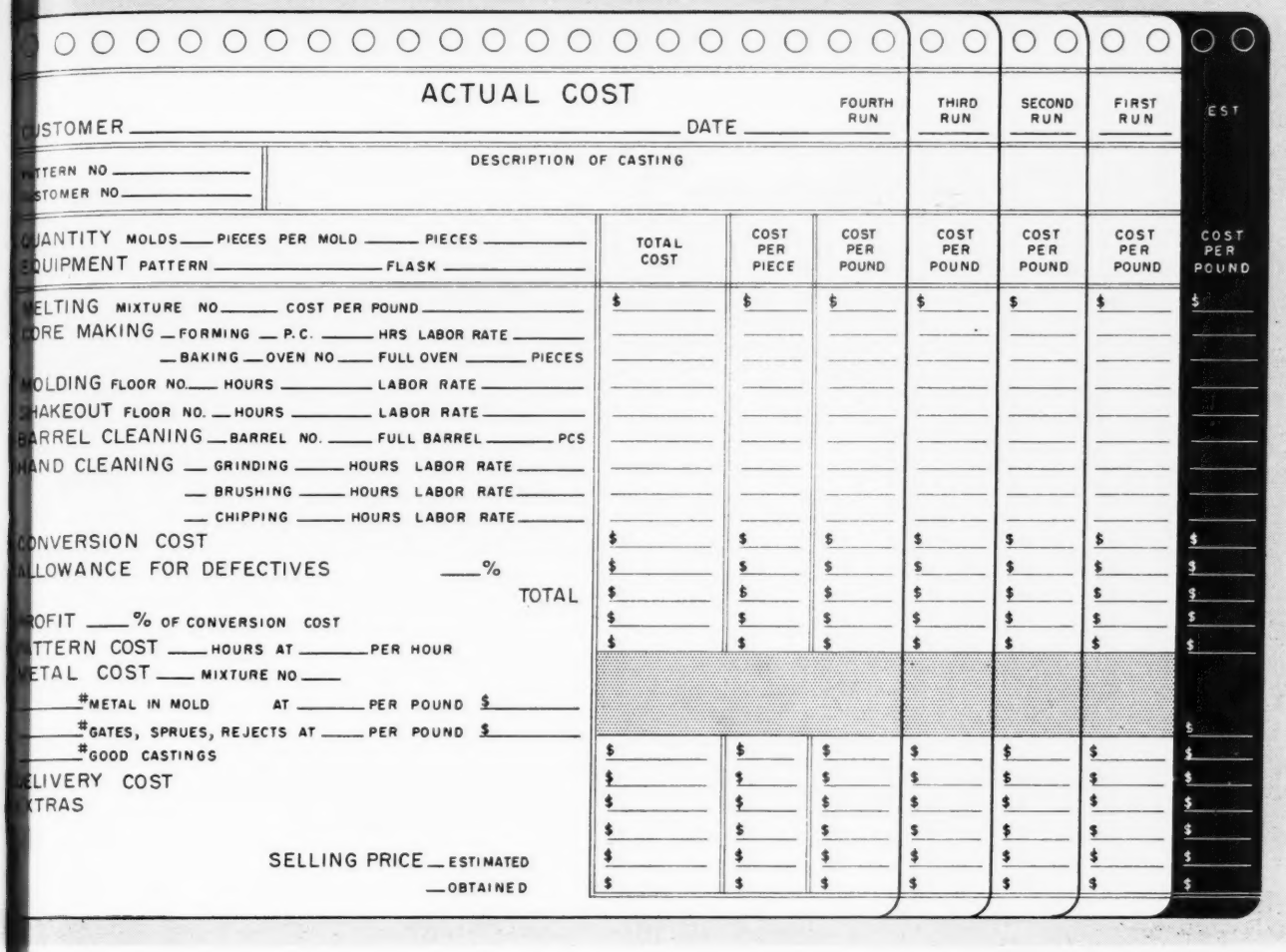
1. Mixture No.
2. Metal in one mold or molds in entire job.
3. Weight of gates, sprues, rejects and melting and pouring loss.
4. Cost per pound of melted metal.
5. Value per pound of remelt gates, sprues and rejects.

Calculate:

1. Cost of metal in mold or molds (weight times cost per pound = total cost).
2. Value of remelt (weight times value per pound = total remelt value).
3. Cost of good castings (cost of metal in mold minus remelt value = cost of good casting).

Melting—Indicate:

1. Mixture No.
2. Cost per pound.



ACTUAL COST

CUSTOMER _____ DATE _____ FOURTH RUN | THIRD RUN | SECOND RUN | FIRST RUN | EST

PATTERN NO _____ CUSTOMER NO _____ DESCRIPTION OF CASTING

QUANTITY MOLDS ___ PIECES PER MOLD ___ PIECES ___
EQUIPMENT PATTERN ___ FLASK ___

	TOTAL COST	COST PER PIECE	COST PER POUND	COST PER POUND	COST PER POUND	COST PER POUND	COST PER POUND
MELTING MIXTURE NO ___ COST PER POUND ___	$	$	$	$	$	$	$
CORE MAKING ___ FORMING ___ P.C. ___ HRS LABOR RATE ___							
___ BAKING ___ OVEN NO ___ FULL OVEN ___ PIECES							
MOLDING FLOOR NO. ___ HOURS ___ LABOR RATE ___							
SHAKEOUT FLOOR NO. ___ HOURS ___ LABOR RATE ___							
BARREL CLEANING ___ BARREL NO. ___ FULL BARREL ___ PCS							
HAND CLEANING ___ GRINDING ___ HOURS LABOR RATE ___							
___ BRUSHING ___ HOURS LABOR RATE ___							
___ CHIPPING ___ HOURS LABOR RATE ___							
CONVERSION COST	$	$	$	$	$	$	$
ALLOWANCE FOR DEFECTIVES ___%	$	$	$	$	$	$	$
TOTAL	$	$	$	$	$	$	$
PROFIT ___% OF CONVERSION COST	$	$	$	$	$	$	$
PATTERN COST ___ HOURS AT ___ PER HOUR	$	$	$	$	$	$	$
METAL COST ___ MIXTURE NO ___							
___ #METAL IN MOLD AT ___ PER POUND $ ___							
___ #GATES, SPRUES, REJECTS AT ___ PER POUND $ ___							
___ #GOOD CASTINGS							$
DELIVERY COST	$	$	$	$	$	$	$
EXTRAS	$	$	$	$	$	$	$
	$	$	$	$	$	$	$
	$	$	$	$	$	$	$
SELLING PRICE ___ ESTIMATED	$	$	$	$	$	$	$
___ OBTAINED	$	$	$	$	$	$	$

Fig. 5—Form used to record actual cost of a job. Here it is superimposed on the estimate sheet so that cost-per-pound comparisons are readily made

Calculate:

1. Metal in mold times cost per pound = total cost.

Core Forming—Indicate:

1. Production center number.
2. Coremaking hours.
3. Hourly labor rate.

Calculate:

1. Hours times hourly operating cost = total cost.

Core Baking—Indicate:

1. Oven number.
2. Pieces in full oven.

Calculate:

1. Pieces in job times cost per piece = total cost.

Molding—Indicate:

1. Molding floor number.
2. Molding hours.
3. Molding labor rate.

Calculate:

1. Production hours times hourly cost = total cost.

Shakeout—Indicate:

1. Floor number.
2. Shaking out hours.
3. Operator's labor rate.

Calculate:

1. Shaking out hours times operator's cost per hour = total cost.

Barrel Cleaning—Indicate:

1. Barrel number.
2. Pieces in full barrel.

Calculate:

1. Pieces in job times cost per piece = total cost.

Hand Cleaning—Indicate:

1. Cleaning hours.
2. Hourly labor rate.

Calculate:

1. Cleaning hours times cost per hour = total cost.

Conversion Cost—Calculate the total cost of melting, core forming, core baking, molding, shakeout, barrel cleaning and hand cleaning.

Allowance for Defectives—A percentage to add to the conversion cost for expected losses of castings found defective after the shakeout operation is difficult to ascertain and is usually based on past production of the same or similar types of castings. If there has been no such production, an estimated percentage must be used. Percentages may be expressed in either weight or pieces, the allowance calculated for the job and added to the conversion cost.

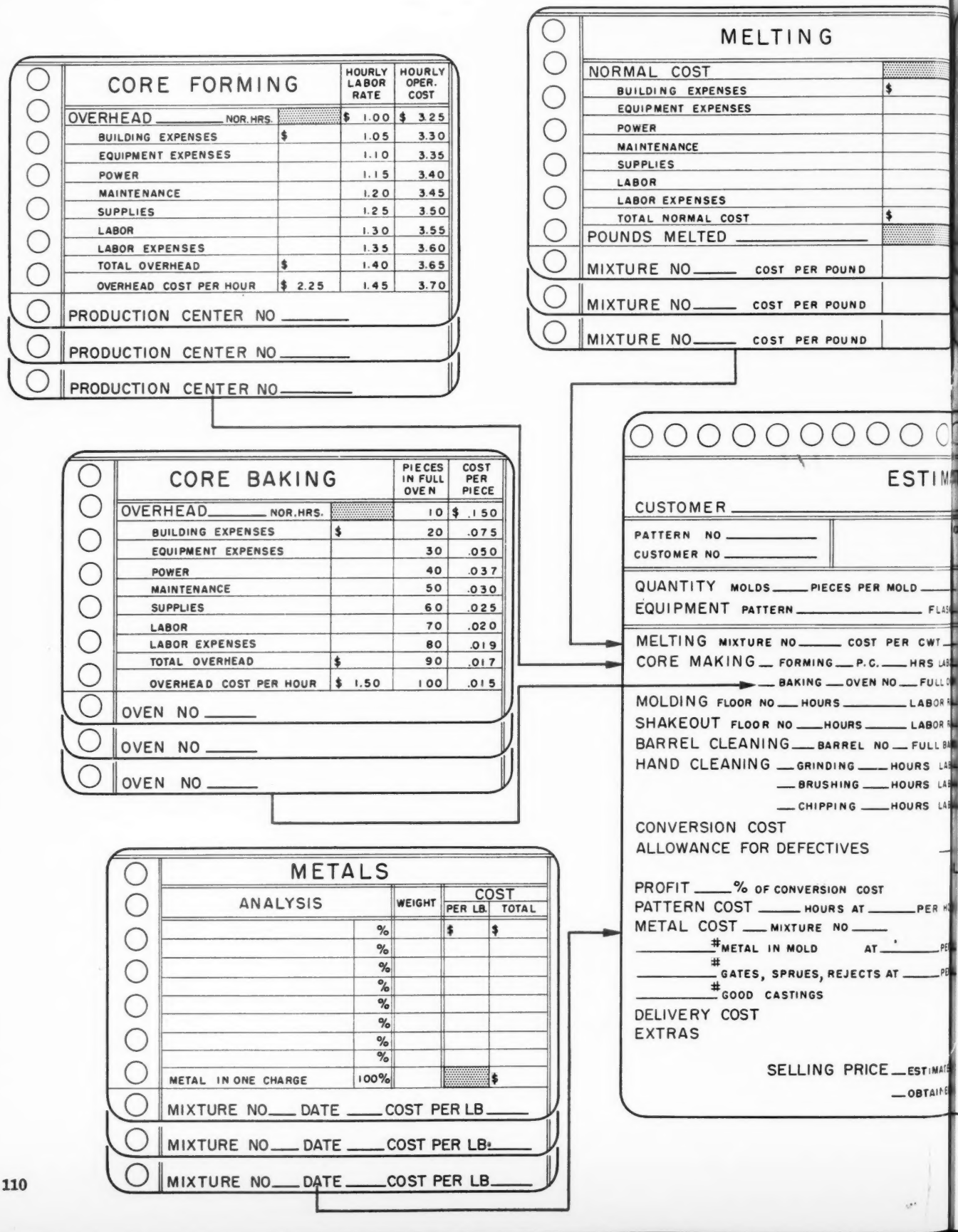
Profit—Since the casting process converts basic metals into shapes and sizes required by customers, profit is calculated as a percentage of total conversion cost. This percentage is arrived at by dividing the total conversion cost for a representative accounting period by the pounds of good castings produced

in the same period and applying the percentage thus obtained to the pounds of good castings on the job being estimated.

In the production of certain types of castings, profit percentages may be better expressed in pieces than in pounds. The estimating procedure would be the same, except that the percentage would be arrived at by a division of the periodical conversion cost by prices produced in the same period. In fact, it may be good practice to use both bases in the same foundry when conditions warrant.

Pattern Cost—The cost of changing the design of patterns and coreboxes and of repairing them is applied to the job on the basis of a departmental rate per hour. The rate is established by dividing

Fig. 6—Tables of costs for various operations and suggested estimate sheet on which to enter data in calculating prices of individual jobs

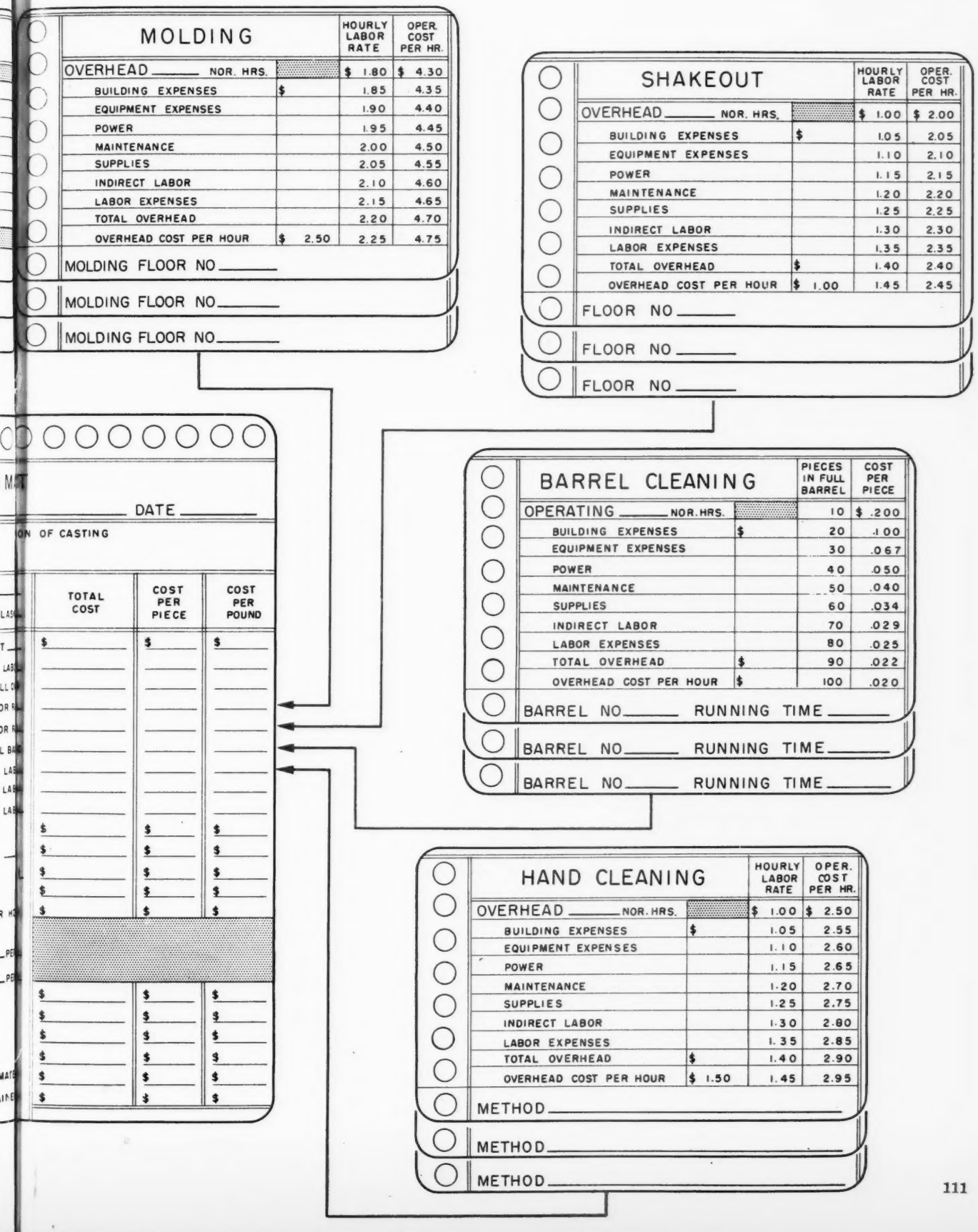


the sum of the direct labor and overhead cost for a designated accounting period by the direct labor hours for the same period.

Where there is a wide variation in hourly wage rates among the pattern-makers, it may be advisable to set up different hourly rates for each wage rate. Analysis of the patternmaking activity of the individual company dictates the necessity for such a procedure.

The cost of pattern material may be of sufficient importance to warrant segregation by individual jobs, and should be included in the estimate below the profit line as an "extra" item. Care must be exercised that these extra costs are not included as an element of overhead when overhead rates are established.

Delivery Costs—Anticipated cost of delivering castings to the customer is made a part of the estimate, below the profit line and (*Please turn to page* 229)



MOLDING		HOURLY LABOR RATE	OPER. COST PER HR.
OVERHEAD ____ NOR. HRS.		$ 1.80	$ 4.30
BUILDING EXPENSES	$	1.85	4.35
EQUIPMENT EXPENSES		1.90	4.40
POWER		1.95	4.45
MAINTENANCE		2.00	4.50
SUPPLIES		2.05	4.55
INDIRECT LABOR		2.10	4.60
LABOR EXPENSES		2.15	4.65
TOTAL OVERHEAD		2.20	4.70
OVERHEAD COST PER HOUR	$ 2.50	2.25	4.75

MOLDING FLOOR NO ____

MOLDING FLOOR NO ____

MOLDING FLOOR NO ____

SHAKEOUT		HOURLY LABOR RATE	OPER. COST PER HR.
OVERHEAD ____ NOR. HRS.		$ 1.00	$ 2.00
BUILDING EXPENSES	$	1.05	2.05
EQUIPMENT EXPENSES		1.10	2.10
POWER		1.15	2.15
MAINTENANCE		1.20	2.20
SUPPLIES		1.25	2.25
INDIRECT LABOR		1.30	2.30
LABOR EXPENSES		1.35	2.35
TOTAL OVERHEAD	$	1.40	2.40
OVERHEAD COST PER HOUR	$ 1.00	1.45	2.45

FLOOR NO ____

FLOOR NO ____

FLOOR NO ____

____ DATE ____

ON OF CASTING

	TOTAL COST	COST PER PIECE	COST PER POUND
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$

BARREL CLEANING		PIECES IN FULL BARREL	COST PER PIECE
OPERATING ____ NOR. HRS.		10	$ .200
BUILDING EXPENSES	$	20	.100
EQUIPMENT EXPENSES		30	.067
POWER		40	.050
MAINTENANCE		50	.040
SUPPLIES		60	.034
INDIRECT LABOR		70	.029
LABOR EXPENSES		80	.025
TOTAL OVERHEAD	$	90	.022
OVERHEAD COST PER HOUR	$	100	.020

BARREL NO ____ RUNNING TIME ____

BARREL NO ____ RUNNING TIME ____

BARREL NO ____ RUNNING TIME ____

HAND CLEANING		HOURLY LABOR RATE	OPER. COST PER HR.
OVERHEAD ____ NOR. HRS.		$ 1.00	$ 2.50
BUILDING EXPENSES	$	1.05	2.55
EQUIPMENT EXPENSES		1.10	2.60
POWER		1.15	2.65
MAINTENANCE		1.20	2.70
SUPPLIES		1.25	2.75
INDIRECT LABOR		1.30	2.80
LABOR EXPENSES		1.35	2.85
TOTAL OVERHEAD	$	1.40	2.90
OVERHEAD COST PER HOUR	$ 1.50	1.45	2.95

METHOD ____

METHOD ____

METHOD ____

By H. W. WAGNER
Research Engineer
Norton Co.
Worcester, Mass.

IN this article, reprinted from Norton Co.'s technical house organ, *Grits and Grinds*, a Norton research engineer discusses how to determine the power and the pressure that are needed for a given rate of stock removal in . . .

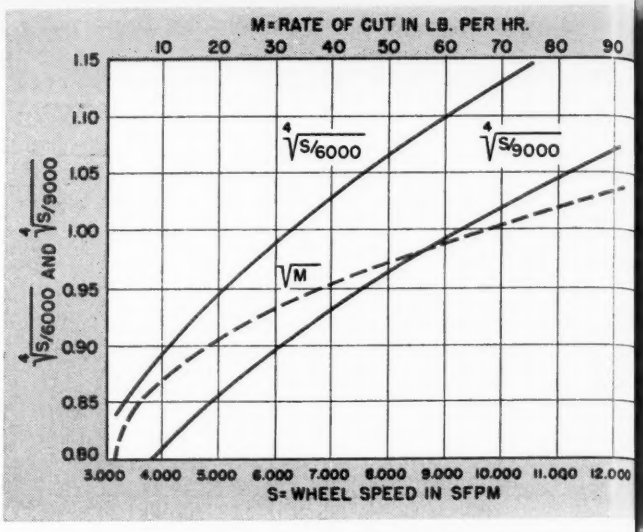


Fig. 1—$\sqrt{M}$ values and wheel speed factors to be used in power formula

SNAGGING OPERATIONS

SUPERINTENDENTS and other personnel concerned with snagging in foundries and steel mills frequently ask questions like these:

"We want to increase the rate of stock removal from steel castings from 10 to 15 lb per hour. How much more grinding pressure and how much more motor horsepower should we provide?"

"What increase in rate of production can we expect in swing frame grinding of billets by changing from low speed to high speed wheels, or by increasing the spindle speed as the wheel diameter is reduced in order to maintain surface speed? We do not want to ask the operators to exert more grinding pressure."

From these typical questions it is obvious that when a swing frame or floorstand grinder is selected or altered (or the operation is modified), it is important to know the approximate power required and/or the pressure needed between grinding wheel and work for a given rate of stock removal.

Looking at the situation from the other direction, and starting with given equipment, one can estimate roughly the maximum rate of cut practicable when the basic relationships are known.

Basic Relationships—Nature has provided us with a law of physics which relates power, pressure, wheel speed and coefficient of "grinding pull." When any three of these factors are known, the fourth can be easily calculated. Even though only approximate values of three factors are known, the fourth can be calculated to a useful degree of accuracy.

The formulas for calculating power and pressure that follow are modifications of the old Prony brake formula for measuring mechanical power.

$$Hp = PCS/33{,}000 \quad (1)$$

$$P = 33{,}000 \times Hp/(CS) \quad (2)$$

Hp is horsepower consumed at grinding contact. P is normal pressure between wheel and work, in pounds. C is coefficient of "grinding pull." S is speed of the wheel in surface feet per minute (sfpm). 33,000 is the foot-pounds of energy per minute supplied by one horsepower.

The relationship among forces and coefficient of "grinding pull" is expressed as follows:

$$C = F/P,\ F = CP \text{ and } P = F/C \quad (3)$$

"F" is the tangential force (pull) in pounds at grinding contact. The coefficient "C" is calculated the same as for coefficient of friction. The forces involved in formulas (1), (2) and (3) are represented in Fig. 4.

For rough practical purposes, when the load on a motor of, say, 1 hp or more, is from 50 to 150 per cent of its rating, "Hp" may be taken also as equal to the kilowatts (Kw) input to the electric motor which drives the wheel. A kilowatt actually equals 1.34 horsepower, but part of the input to the motor is lost in its windings and in friction when power is transmitted to the wheel.

"Grinding Pull"—The coefficient of "grinding pull" can vary over a wide range in grinding. In dry snagging it is usually confined to the range of 0.10 to 0.30, which is lower than in wet precision grinding. It is higher for a clean, sharp wheel face than for a glazed wheel face. When soft steel is being ground, loading causes a small rise of the coefficient, at least in some cases.

Intermediate values of "C", the coefficient of grinding pull, are given in Table I for dry snagging of ferrous metals.

The "C" value for annealed malleable cast iron would be expected to come between those of soft steel and gray cast iron.

Rate of Cut—A higher rate of cut naturally draws

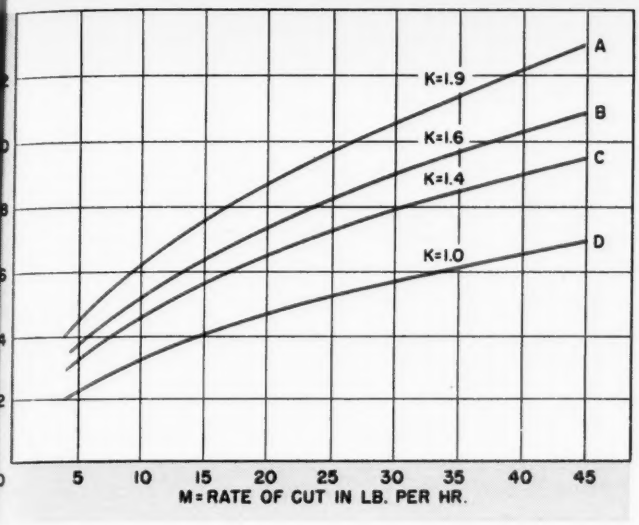


Fig. 2—Power related to rate of cut according to Formula 6 and Table II

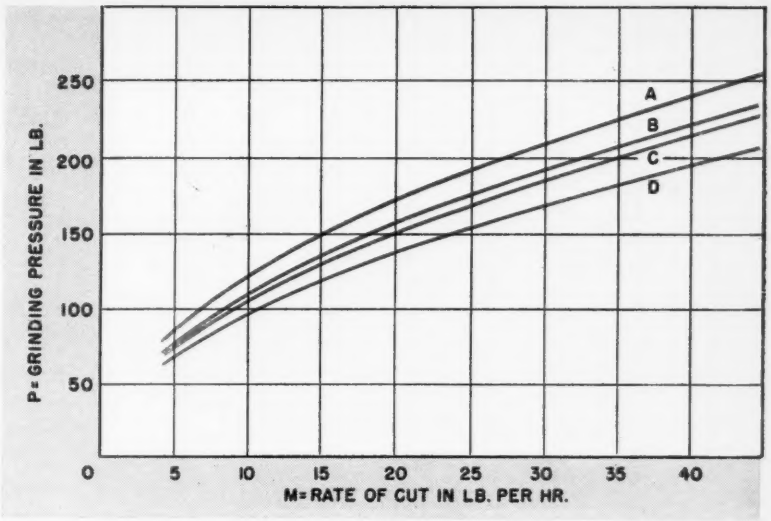


Fig. 3 (above) — Illustrative snagging pressures as they are related to rate of cut

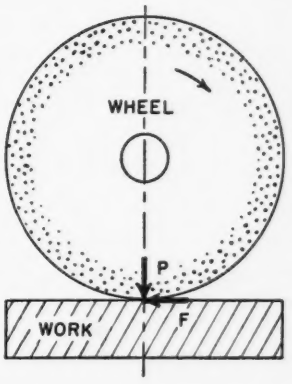


Fig. 4 (right)—Main grinding forces are P (normal force or grinding pressure) and F (tangential force)

more power, but not in direct proportion. When rate of cut is changed by adjustment of pressure and selection of a suitable wheel specification for each pressure, the power is more nearly proportional to the square root of the rate of cut. A higher wheel speed also requires somewhat more power for a given rate of cut.

Approximate empirical power formulas for snagging with coarse grit wheels are written as follows:

For resinoid wheels,

$$Hp = K\sqrt{M}\ \sqrt[4]{S/9000} \quad \ldots\ldots (4)$$

For vitrified wheels,

$$Hp = K\sqrt{M}\ \sqrt[4]{S/6000} \quad \ldots\ldots (5)$$

Hp equals horsepower consumed at contact or kilowatts input to the motor which drives the wheel. M equals rate of stock removal in pounds per hour, counting only contact time. S equals wheel speed in sfpm. K equals a factor depending on type of machine, kind of wheel and on whether formula (4) or (5) applies.

When resinoid and vitrified wheels are run at 9000 and 6000 sfpm, respectively, the speed factors become unity, and both formulas are simplified to the expression:

$$Hp = K\sqrt{M} \quad \ldots\ldots (6)$$

Values of "$\sqrt{M}$" and wheel speed factors may be read off Fig. 1 for use in the formulas.

Values of "K" selected from typical ranges determined by laboratory experiment are given in Table II. They represent wheels of approximately the size 2 x 20 in. and of typical grains and grades when the wheel or work is oscillated in grinding to keep the working periphery of the wheel well rounded.

"K" values for annealed malleable iron would be expected to come between those of gray iron and soft steel. The much greater ease of grinding gray cast iron and annealed malleable iron than steel is reflected not so much in the lower power required as in the higher ratios of material removed to wheel wear.

Factor "K"—The values of "K" in Table II are as selected from laboratory grinding on the interior of billets and castings after the rough skin had been removed. In production (*Please turn to page* 264)

TABLE I—Coefficient of Grinding Pull

Work Material	Kind of Wheel	Coefficient of Grinding Pull
Soft steels	Resinoid	0.20
	Vitrified	.23
Gray cast iron	Resinoid	.14
	Vitrified	.18
Hard cast iron (representing unannealed malleable iron)	Vitrified	.13

TABLE II—Values of the Factor "K"

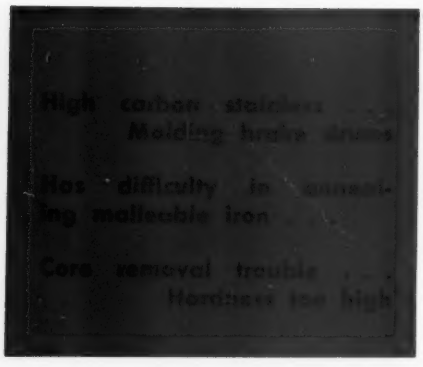
Operation	Work	Wheel	Approximate Grade	Wheel Speed (sfpm)*	"K" Value
Swing frame	soft steel	Resinoid	S	9000	1.9
		Vitrified	R	6000	1.6
Floor stand	soft steel	Resinoid	Q	9000	1.7
		Vitrified	P	6000	1.4
Floor stand	gray cast iron	Resinoid	R	9000	1.4
		Vitrified	O	6000	1.0
Floor stand	hard cast iron**	Vitrified	R	6000	1.5

* Wheel speed as 9000 or 6000 as in formula [4] or [5].
** A cast iron of about Rockwell C40 hardness, and representing unannealed malleable iron.

TABLE III—Illustrative Power, Pressure, etc., in Dry Snagging

Machine	Swing Frame	Swing Frame	Floor Stand	Floor Stand
Work Material	Soft Steel	Soft Steel	Soft Steel	Gray Cast Iron
Bond of wheel	Resinoid	Vitrified	Vitrified	Vitrified
Grade of wheel	S	R	P	O
Assumed wheel speed (S) in sfpm.	9000	6000	5000	5000
"K" Value (from Table II)	1.9	1.6	1.4	1.0
Rate of cut (M) lb/hr.	25	12	10	15
Approx. kilowatts drawn by motor	9.5	5.5	4.2	3.7
Approx. horsepower used at grinding contact	9.5	5.5	4.2	3.7
Foot-pounds of energy per min., consumed at contact	314,000	182,000	139,000	122,000
Tangential force (F), lb.	34.9	30.3	27.8	24.4
Coefficient of grinding pull (C) (from Table I)	0.20	0.23	0.23	0.18
Calculated grinding pressure (P), lb	175	130	120	135

QUESTIONS



Stainless Is High in Carbon

QUESTION We have a supply of 347 stainless (0.08 per cent C max., 2.0 per cent Mn max, 1.0 per cent Si max, 17 to 19 per cent Cr, 9 to 12 Ni, and 10 × C min Cb) on hand which has a carbon content of 0.10 to 0.15 per cent. Since the specification as indicated allows 0.08 per cent C max what procedure would you suggest to reduce it below that maximum? We use either a 150 or 300-lb high-frequency induction furnace with a magnesia lining. If prolonged boiling or oxidation is the answer, how would this affect the Cb, Si, Mn, and Cr contents?

ANSWER Presumably you have a rather large supply of the 347 stainless on hand which necessitates use of charges composed completely of it. If that is the case we believe the best procedure would be to melt the steel and raise the temperature to above 3150°F, and blow with oxygen. The hotter the bath when blown the better, since that minimizes the loss of Cr. However, some as well as a good deal of the Si and Mn, and probably all of the Cb, will be lost.

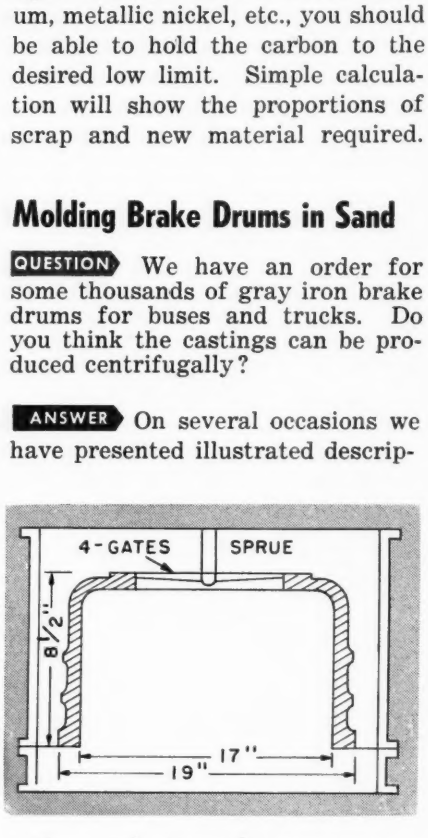
Unfortunately, there is no exact information on blowing down small heats of stainless steels in the induction furnace as you contemplate, but it is fairly well established that the rate of C removal with O_2 diminishes as amount of C decreases. Hence, you will have to experiment to determine the amount of oxygen needed to bring the carbon down to the desired point, as well as the losses in other elements, so that proper adjustments can be made.

However, if you have only small amounts of the high-carbon scrap, it would be better to use it up in small doses with new material as the major part of the charge. In that way, using ingot iron or equivalent, low-carbon ferrochromium, metallic nickel, etc., you should be able to hold the carbon to the desired low limit. Simple calculation will show the proportions of scrap and new material required.

Molding Brake Drums in Sand

QUESTION We have an order for some thousands of gray iron brake drums for buses and trucks. Do you think the castings can be produced centrifugally?

ANSWER On several occasions we have presented illustrated descrip-



Drag and core made on one machine, cope and cheek on another

tions of methods and equipment for producing automotive brake drums centrifugally. Therefore, a direct answer to your question is yes. However, according to all the FOUNDRY articles dealing with this subject, a great deal of costly experimental work had to be carried on before success was attained.

Unless the anticipated profit from your present order is sufficient to absorb the cost of the centrifugal equipment, and the cost of the inevitable experimental work, we are inclined to the opinion you should make the castings from two patterns, in sand molds, in a two-part flask, one for the combined drag and core, and one for the combined cheek and cope. If necessary, a thin ring core will form the grooves in the vertical wall.

Has Difficulty in Annealing

QUESTION We are making malleable iron pipe fittings, using the cupola process and pot annealing but find some of the fittings are only partly annealed. Composition is in the range 3.0 to 3.2 per cent C, 0.90 to 1.10 per cent Si, 0.1 per cent P, 0.18 per cent S, and 0.55 per cent Mn. Chromium occasionally runs as high as 0.03 per cent. Metal is poured between 2780 and 2850° F. Molds are shaken out about 8 minutes after pouring, and castings pass through a large tumbling mill where they are sprayed with water. Castings are annealed in pots stacked four high and placed tightly in the oven with about 6 in. clearance on all sides of oven. Stools are 6 in. above floor. Annealing cycle is to heat as fast as possible to 1800°, using natural gas which takes about 20 hr. Temperature inside pots is held as near as possible to 1800° for 10 hr. From 1400 to 1300° we cool at not more than 9° per hr which takes about 13 hr. When oven reaches 1200° doors are cracked open and at 1100° oven is pulled. Four thermocouples extend into annealing pots at the four corners of the oven which we believe represent the coldest parts.

ANSWER If the chromium limit of 0.03 per cent is maintained in the composition shown, you should have no difficulty with annealing. Therefore, it appears that some part of the annealing procedure may be suspect. For example, you state that the annealing pots are placed tightly in the oven with approximately 6 in. clearance on all sides. We believe that you will obtain more uniform heating by allowing at least 4 in. between the pots to promote circulation of the

ANSWERS

heated gases in the oven. It is quite possible that with tight placement, the pots in the center of the mass do not heat up or cool down as rapidly as those on the outside, hence there is a lag which must be compensated for by extending the time interval.

You could ascertain whether or not such a condition exists by placing thermocouples in the pots in the center, and compare their readings with those you ordinarily employ. From such observations the necessary corrections could be established.

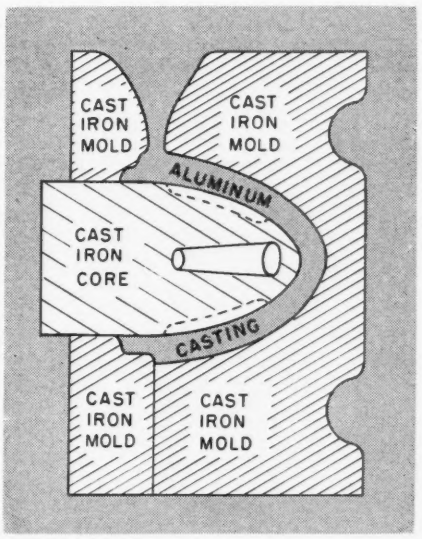
The other condition which might lead to some of your trouble is the somewhat rapid rate of cooling from 1400 to 1300° F. It may be worthwhile to experiment with slower rates, and select that which always insures satisfactory end results. Again it might be, as pointed out, that some of the castings in the center pots may be at a higher temperature than you think when the doors are cracked which may cause some carbide precipitation.

Core Is Difficult To Remove

QUESTION We have difficulty in removing cast iron cores in permanent mold casting of aluminum alloys due to the vacuum created. We have attempted to eliminate this by drilling a small hole through the cast iron core and placing a sand plug in the hole. Is there a better material that can be used as the plug? Design of the mold makes it impractical to use a sand core. Also the aluminum shrinkage gives a great deal of trouble. A rough sketch to show the arrangement of the mold is enclosed.

ANSWER Your trouble in removing the core from the casting is due to contraction of the aluminum alloy in the solid state, rather than development of a vacuum. You may be able to eliminate some of the difficulty by withdrawing the core as soon as the metal solidifies and before any appreciable solid contraction occurs. You can determine that experimentally by withdrawing the core at various intervals after pouring, and then selecting that time which gives best results.

You do not mention whether or not you are using a refractory coating on the core. If you are not, it is advisable to do so to eliminate sticking. Also it is possible that the core may contain nicks, fine cracks, etc. which permit the metal to get a tighter grip than where the surface is as smooth as possible.



Contraction of aluminum around core causes trouble in removal

Another point is whether or not you have provided some draft on the straight portion of the core just behind the nose or curved section.

Your reference to shrinkage is not quite clear. If you mean that you run into shrinkage voids, it is an indication that the gate freezes off before solidification is complete, and it should be opened up. Possibly you may be able to eliminate the trouble by coating the gate area with a heavy insulating refractory wash to decrease the cooling rate.

Brinell Hardness Is Too High

QUESTION We are making manifolds which require an alloy iron with 0.50 to 0.60 per cent Cr and 0.20 to 0.40 per cent Mo. Our base iron contains 2.20 to 2.40 per cent Si; 3.40 to 3.50 per cent TC; 0.60 to 0.80 per cent Mn; 0.095 per cent S, and 0.125 per cent P. Our customer is complaining of high brinell hardness. Can you advise what this mixture should brinell on a ¾-in. flange section? Occasionally we receive an order for 0.75 per cent Cr and 0.75 per cent Mo on which we use the same base iron. Both alloy irons are to brinell under 228. Is this possible? Can we change our mix to bring the brinell with the above alloys below 228?

ANSWER Trying to predict the hardness of gray iron, plain or alloyed, without having all the facts in one's possession, and more particularly the foundry's own experience—is rather hazardous. Hardness, of course, depends on the microstructure of the alloy, and the microstructure is determined by such factors as the chemical composition, pouring temperature, section thickness, cooling rate, etc. Hence, without knowledge of those factors any suggestion as to hardness values is purely a "guesstimate."

If the tensile strength values were available, one might be able to arrive at reasonable estimates of brinell hardness by applying the equation developed by MacKenzie that states $TS = 1.82(Bhn)^{1.85}$, but since they are not, another approach can be tried. In the 1950 *Transactions* of the American Foundrymen's Society, Schneidewind and McElwee suggested the equation $TS = 10{,}000(11.5 - 2\,CE)$ for the 1.2-in. diam test bar as well as some factors for various alloys used. By use of those factors the tensile strength of the low-alloy mix is about 41,250 psi, and that of the high alloy mix 51,800 psi. Applying those values to Mac-

QUESTIONS ? ANSWERS

Kenzie's equation mentioned earlier, the brinell numbers in the 1.2-in. bar are 226 and 256 respectively.

At this point it again should be stressed that the indicated figures are far from being exact since Schneidewind and McElwee point out that use of the equation, etc. shows values within ±10 to 15 per cent of actual test values, and MacKenzie likewise indicates standard deviations of 7 to 13 per cent of the average Bhn in the tensile strength classes under consideration. Hence, too much dependence should not be placed on the figures mentioned.

Used only to indicate a trend, the hardness values cited show that the low-alloy mixture, as far as the 1.2-in. bar is concerned, probably will meet the 228 limitation, but the high alloy composition will not. Since the ¾-in. flange section you mention will cool at a faster rate than a 1.2-in. bar, one can safely assume that the hardness numbers will be higher.

Since you are confronted with meeting specifications on brinell hardness, it would be well worth your while to purchase an instrument for determining such values, make standard 1.2-in. test bars, and correlate the results obtained on those with values on specific areas of the castings in question —for example, the flanges on manifolds. Once correlated, the test-bar brinell could be used as the criterion for the quantity of manifolds poured from a ladle of metal.

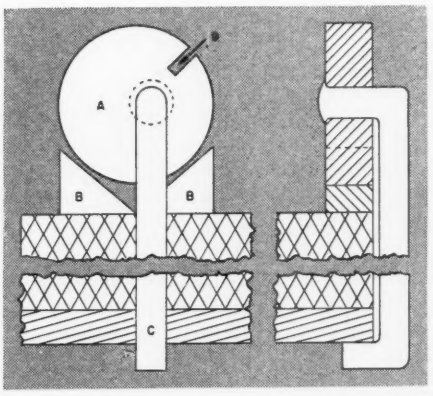
As to methods of reducing high brinell hardness, the first thing that comes to mind is reduction of the chromium content, since it is a strong carbide stabilizer. Molybdenum is considered a mild carbide stabilizer. You also might try adding part of the silicon in the ladle—say 0.25 to 0.50 per cent—instead of charging it all in the cupola. The latter procedure, known as inoculation, has a decidedly different effect on microstructure than the same amount passing through the cupola.

It also may be worthwhile to go to your consumer and find out whether he actually has correlated brinell hardness and machinability. While hardness often is used as a gage of machinability, it is not infallible, since some irons as much as 50 numbers higher machine better than those of a lower hardness.

Tighten Clamp with Small Cam

QUESTION Several years ago in FOUNDRY we saw an illustrated description of special type clamp used in connection with a cast iron grid resting on a cover core which served as a cope on a small flywheel mold. Can you favor us with any advice on this item?

ANSWER The description was written by the late J. H. Eastham who credited H. Rypsan, pattern



Slight movement of the cam resting on tapered lugs tightens clamp

shop superintendent, with the design of the clamp. The grid is provided with two tapered lugs at either end which rest on the drag frame as shown at *B B* in the accompanying illustration. An iron disk *A*, 3 in. diam, ⅝ in. thick, is provided with a ⅞-in.-diam hole a little off center. The upper toe of a ¾-in. clamp is riveted through the hole in such a manner that it is free to swing, but not to come out. The lower toe is turned in the usual manner to secure a firm grip on the bottom board.

In practice the grid is placed on top of the core that serves as a cope. The outer ends of the grid rest on the drag frame. In the event that the grid does not actually touch the core, a pinch of sand or a small wedge is employed to make contact. The disk *A* is placed between the tapered faces of the lugs *B B* while the lower toe of the clamp is pushed under the bottom board. An old file or other piece of flat steel is inserted in the gap *D* and the disk is pulled up a short distance.

The cam construction tightens the clamp and holds it in place. After the mold is poured, a slight blow or a kick releases the clamp. The binder grid also may serve as a runner box if necessary. The runner basin may be made up in the center, or in any of the other pockets.

Slag Foaming in the Cupola

QUESTION We melt approximately 60 tons per day in a cupola lined to 54 in. The greater part of the burden is auto cylinder blocks which are thrown into the cupola without breaking. Slag flowing from a hole in the back of the cupola falls into a succession of iron pots suspended from a monorail leading to the dumping place in the yard. Recently the slag has been acting in an unusual manner. It comes wildly through the slag hole, boils up and out of the pots, and in some instances foams up in the cupola and enters the tuyeres. We shall appreciate an expression of opinion on the cause of the peculiar phenomenon.

ANSWER You are not the first, and probably will not be the last, foundryman confronted by this condition. Improper cupola practice frequently promotes a bessemerizing action in the cupola. The following comment is from *Principles of Iron Founding* by the late eminent authority Dr. Richard Moldenke.

"When the fuel bed in the cupola is allowed to sink too low during a heat, the metal is forced to melt too close to the tuyeres, with resulting oxidation of not only the silicon, manganese and carbon, but also of much iron. This iron oxide attacks the lining, and with the ash and sand present from

(*Concluded on page* 118)

Even the Smallest Foundries need Sand Preparation, too!

There's a ROYER SAND CONDITIONER of proper capacity for every shop

The need for sand preparation equipment in small to medium sized foundries is just as great as it is in large production shops —but the machine must be designed for the job. And that *is* the case with Royer Sand Separators and Blenders. The models illustrated (the Junior, NB-2 and NC-4) are made for foundries needing a comparatively small tonnage of prepared sand . . . but definitely needing it.

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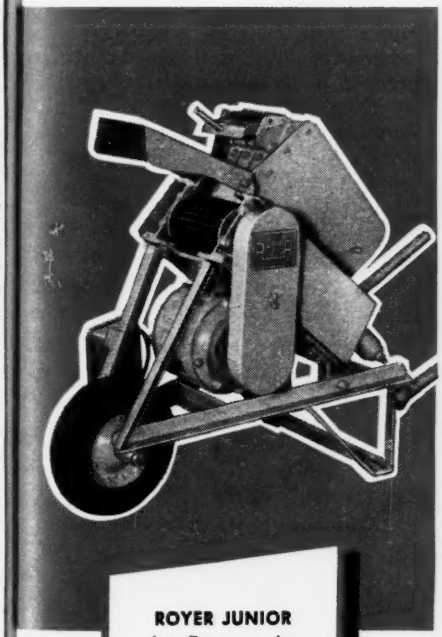

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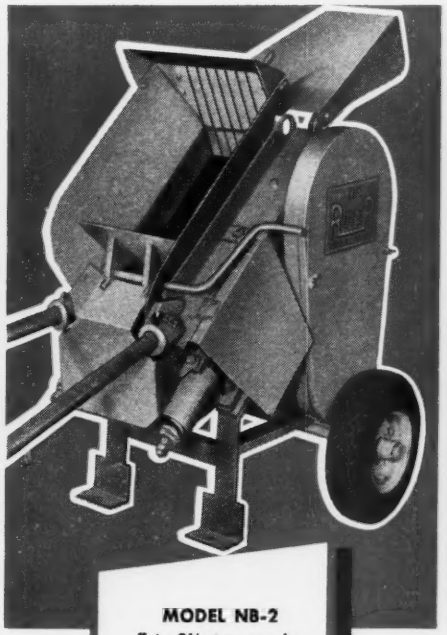
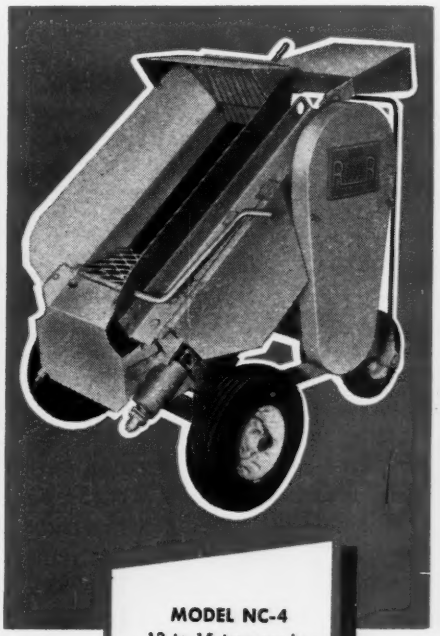


MODEL NB-2
7 to 9½ tons per hr.



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Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

QUESTIONS ? ANSWERS

(*Concluded from page* 116)

coke and iron charges produces a copious *foaming* slag. In some instances the blast carries this light slag up to and out through the charging door. If the blast is shut off the slag drops again and floods the windbox through the tuyeres, a very nasty mess. Hence the supreme importance of melting in the proper position above the tuyeres. It is the basis of successful cupola practice."

In your case the practice of charging unbroken auto engine blocks in a 54-in. cupola may be a contributory factor. If they are thrown in haphazardly, a great amount of empty space will appear between them. The components of the charge—coke, iron and limestone—will not sink uniformly. Obviously, either the blocks should be broken or the spaces between should be filled with small iron scrap.

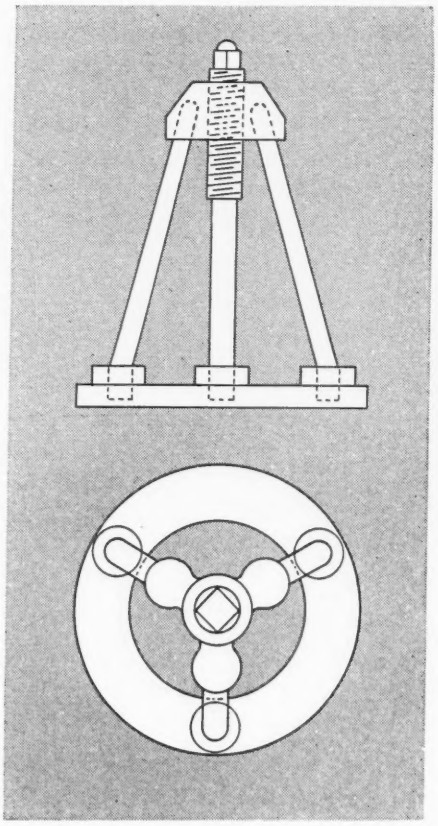
Design Improved Flask Stand

QUESTION Several years ago we saw an illustrated description of a stand for supporting large copes after they were lifted from the drags, but do not remember the publication in which this item appeared. We shall appreciate any information which may be available.

ANSWER We are inclined to the opinion that the item you have in mind appeared in FOUNDRY under the signature of H. J. Bayly. The stand shown in the accompanying illustration includes a cast iron base ring with bosses supporting three steel bars. The upper ends of the bars enter a cast iron nut. The bars are cast in the base and in the nut. Bars may be of any convenient length and diameter.

In the author's foundry four sizes ranged from 2 to 5 ft high. The entire stand may be made and assembled in the foundry without any, or very little assistance from the machine or pattern shop. The thread in the nut has a coarse pitch, a feature which makes it relatively simple to cast the thread on the screw and in the nut.

Among the many advantages of this type stand over those usually seen in foundries, the following may be listed. One man easily can roll them from place to place. When not in use they may be rolled into the yard out of the way. Owing to the shape of the base they readily may be adjusted to rest firmly on the floor. It is not necessary to use blocks and wedges to engage the lower face of the cope sides or ends. The screw is about 1 ft long, sufficient to compensate for practically any unevenness in the floor.



The cast iron screw works in a cast iron nut supported on three steel bars anchored in a circular base

A small plate with a hollow on the lower side resting on the rounded end of the screw forms an adjustable and firm bearing for the cope. To all intents and purposes the complete stand is a jackscrew. The only essential difference is that it is used to sustain a weight whil the jackscrew is employed to mov a weight. The screw in the stan is an easy fit and may be move by hand. If necessary, a spanne may be applied to the square hea

Mounting Seat in Gate Valve

QUESTION Please advise us as full and as quickly as possible on th accepted procedure for mountin bronze on cast iron. For exampl the bronze mounting which is use in an iron-body gate valve.

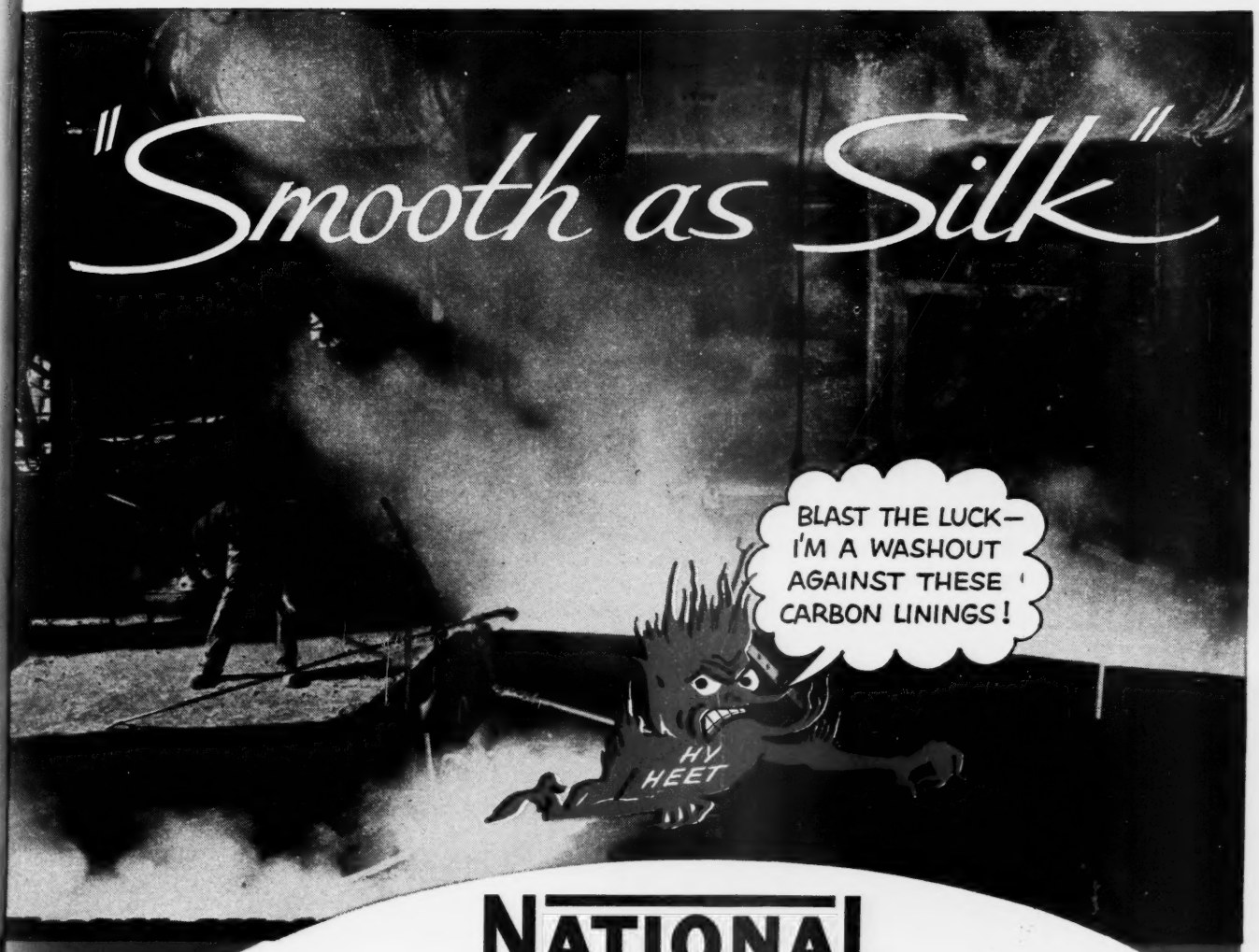
ANSWER Several different meth ods are employed for mountin bronze seats in gate valves. On method is to use a machined bronz seat which is screwed into the iro body or pressed on with a tongu and groove. Another procedure i to place the bronze ring on th core, and cast the iron body aroun it. After partial machining, th bronze is rolled or pressed to in sure a tight joint. Another prac tice is to machine the tubular rin or seat, and then roll it into place

Composition for Tractor Shoe

QUESTION We operate a foundr in Portugal, and are greatly inter ested in producing spare shoes fo tractors as well as bushings, pins links, etc. We will appreciate in formation on suitable composition for them and whether they mus be submitted to special heat treat ment such as case hardening flame hardening, etc.

ANSWER In this country, shoes and links for tractor treads ordi narily are made in one piece and of many different designs. Shoes generally are made of nickel-chrome steel containing 1½ per cent Ni, 1 per cent Cr, and 0.50 C After normalizing and drawing they are differentially hardened on the wearing surface by quenching in a shallow bath of water as they roll along on the conveyor. Pins can be made of rolled nickel-chromium steel of about the same analysis; quenched and tempered.

Bushings generally are made of either a soft-carbon or a soft nickel steel, case hardened. Designs differ so much that it is not possible to give more than general instructions for compositions. For instance, you mention shoes and links, and if they are separate, only the shoe would be differentially-hardened.



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TYPICAL of the many comments favoring carbon-lined furnaces after the recent strike, was that made by the manager of a large eastern mill.

Describing his carbon hearths as coming back on blast "smooth as silk", he joins the many other users reporting faster, easier, more economical return to normal operation with carbon lined furnaces than with any other type of lining.

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MEN of Industry

ALBERT L. HUNT, for the past year general superintendent of foundries, National Bearing Division, American Brake Shoe Co., St. Louis, has been named manager of industrial sales for the division. Mr. Hunt joined the engineering department of National Bearing in 1936 and, following experience in operation and sales, became plant superintendent in 1942. He will continue to be located in St. Louis. Mr. Hunt is a national director of the American Foundrymen's Society and a past chairman of its St. Louis District Chapter.

♦ ♦ ♦

Ronald D. Gumbert was recently appointed executive vice president, Alloy Precision Castings Co., Cleveland. Mr. Gumbert was graduated from Carnegie Institute of Technology and was an industrial engineer at the Clairton, Pa., plant of U. S. Steel Corp. For the past 11 years he was production superintendent at the Pittsburgh plant of Armstrong Cork Co., Lancaster, Pa.

♦ ♦ ♦

George O. Shutzbaugh has joined the research and development staff, Alloy Engineering & Casting Co., Champaign, Ill., as an associate director of Armed Services Research and Development Projects. Mr. Shutzbaugh was formerly assistant chief of the ferrous and nonferrous metal section, Directorate of Industrial Resources, Headquarters, U. S. Air Force. Previous to recall to active duty in the Air Force he was plant manager, Southern Illinois Foundry Co., Carmi, Ill.

♦ ♦ ♦

Claude B. Schneible, recently elected president of the Foundry Equipment Manufacturers' Association, is president, Claude B. Schneible Co., Detroit, engineers, designers and manufacturers of dust, fume and odor control equipment. Mr. Schneible attended Northwestern University and from 1918 to 1924 was a member of the sales organization of the former American Foundry Equipment Co., now American Wheelabrator & Equipment Corp., Mishawaka, Ind. Following 4 years spent in engineering research in the chemical, oil and gas industries, he returned to American Wheelabrator as factory representative. In 1935 he organized Claude B. Schneible Co. in Chicago, and in 1943, when manufacturing facilities were acquired in Detroit, the company was moved there. Mr. Schneible was president of the Foundry Educational Foundation in 1950 and its chairman last year.

♦ ♦ ♦

William G. Laffer has been named president, Cleveland Graphite Bronze Co., subsidiary of Clevite Corp., Cleveland. Mr. Laffer joined the company in 1927, following graduation from Yale University. He has been vice president in charge of manufacturing since 1948. **Fred P. Salzman** is works manager.

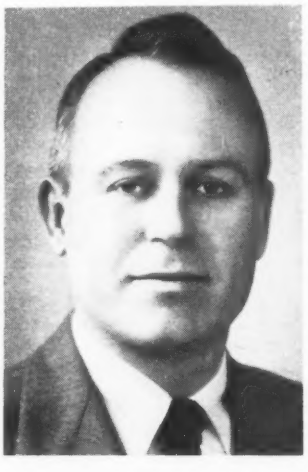
♦ ♦ ♦

Henry J. Neils has been elected chairman-treasurer, Flour City Ornamental Iron Co., Minneapolis. Other officers recently named include: **W. R. Westphal,** president; **Carl R. Schuler, J. A. Hallberg** and **Clarence Seidel,** vice presidents; **Henry E. Neils,** secretary; and **Cornelius H. Lucas,** assistant secretary-assistant treasurer.

♦ ♦ ♦

George W. Baker has been appointed sales engineer in the Indianapolis office Dravo Corp., Pittsburgh. Mr. Baker was graduated from Purdue University and for several years has handled sales of Dravo's

(Continued on page 122)

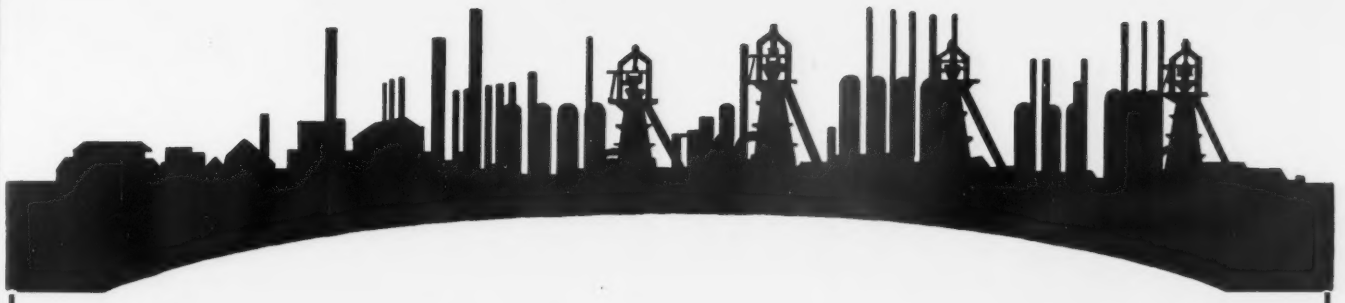


ALBERT L. HUNT
. . . National Bearing sales

RONALD D. GUMBERT
. . . Alloy Precision exec.

GEORGE O. SHUTZBAUGH
. . . joins Alloy Engineering

CLAUDE B. SCHNEIBLE
. . . president, FEMA



WOODWARD IRON COMPANY
Looks *FORWARD*

WOODWARD has affirmed its staunch faith in the continued forward march of the Nation's foundry industry by expending $18,000,000 in the past five years to expand and modernize its plants and facilities.

This is the largest capital improvement program in the 70-year history of the Company.

Major projects have included the erection of a new Number 4 blast furnace, construction of 30 additional coke ovens, modernization of its coal and ore mines, enlargement of its coal washer, additions to its transportation facilities and installation of a large amount of auxiliary equipment.

To Woodward customers this huge improvement and expansion program means a still larger . . . still more dependable source of that uniform quality iron which Woodward has consistently produced since 1882.

Woodward Iron Company

WOODWARD, ALABAMA

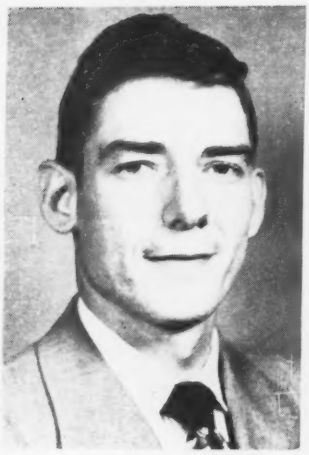
Independent Since 1882

GENERAL SALES OFFICES: 1515 First National Building Phone 54-1667

Birmingham, Alabama

JOHN E. MULLEN
. . . *Brad Foote Gear sales*

J. M. PLANTEN
. . . *mgr., plant engineering*



RODERICK L. SMITH
. . . *Norton sales, Chicago*

PHILIP H. THRESHIE JR.
. . . *West coast sales, Norton*

(*Continued from page* 120)

products and services for the machinery division in the Pitsburgh territory.

♦ ♦ ♦

John E. Mullen, formerly vice president in charge of sales, National Erie Corp., Erie, Pa., has been appointed regional sales representative in Ohio and Pennsylvania for Brad Foote Gear Works Inc., Chicago. Mr. Mullen is well known in the steel foundry industry and in 1950 was vice president of the Steel Founders' Society of America. He also served on the executive committee of the American Gear Manufacturer's Association.

♦ ♦ ♦

James F. Bishop has been appointed general manager, American Hoist & Derrick Co., St. Paul, in addition to his duties as secretary-treasurer. Mr. Bishop joined the company in 1923, became secretary-treasurer in 1945 and was named a director last year.

J. M. Planten has been appointed manager of plant engineering in the New York office of Lester B. Knight & Associates, Chicago. Mr. Planten has been associated with the company since 1946.

♦ ♦ ♦

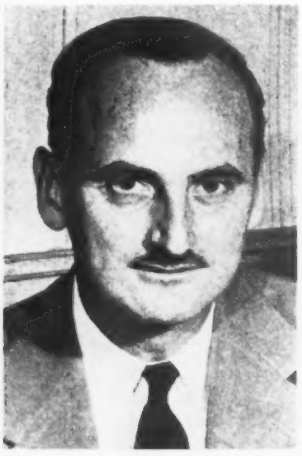
Daniel T. Wellman has been named president, Wellman Bronze & Aluminum Co., Cleveland, succeeding his father, **Fred S. Wellman,** who has become chairman of the board. **Holley G. Wellman** continues as vice president of the company. Mr. Wellman, the new president, was graduated from Colgate University and was in the sales and production departments of the company from 1935 to 1940, when he joined the sales department of Dow Chemical Co., Midland, Mich. Since 1943 he has been manager of Dow's Cleveland office. Fred S. Wellman and Holley G. Wellman, brothers, have been associated with Wellman Bronze & Aluminum Co. since it was founded by their father, S. T. Wellman, 42 years ago.

Philip H. Threshie Jr. was recently appointed field engineer in the Pacific Coast district, Norton Co., Worcester, Mass. Following Navy service, Mr. Threshie attended Yale University and Trinity College. He joined Norton Co. last June as a sales trainee, completing his course in November. Prior to that he was assistant purchasing agent, Acushnet Process Co., New Bedford, Mass. **Roderick L. Smith** has been named field engineer in the Chicago territory for Norton Co. He was graduated from University of Wisconsin and joined the company early last year, first serving as sales trainee, and later grinding engineer in the sales engineering department.

♦ ♦ ♦

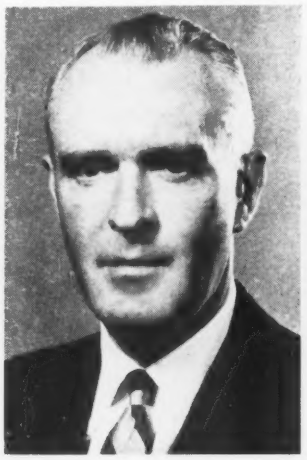
D. Bruce Ervin has joined the J. O. Ross Engineering Corp., as sales representative in Pennsylvania, New Jersey, Delaware, Maryland, Virginia and West Virginia, with headquarters at the home office in New York. Mr. Ervin, a gradaute of University

(*Continued on page* 124)

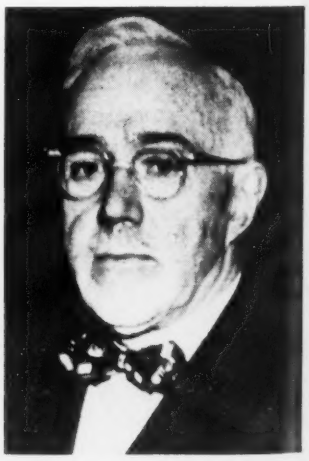


JAMES F. BISHOP
. . . *American Hoist mgr.*

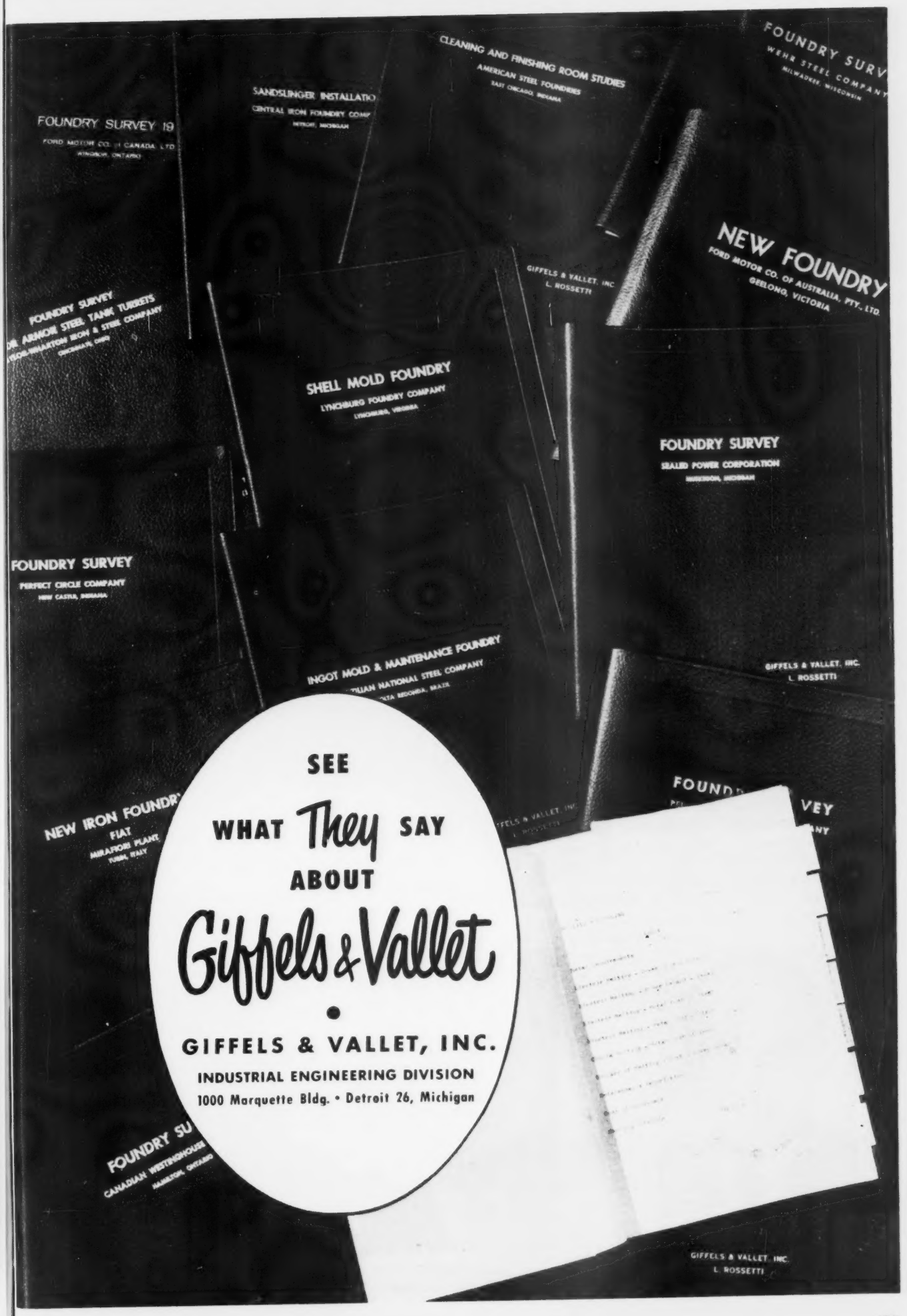
FRED S. WELLMAN
. . . *chairman, Wellman Bronze*



DANIEL T. WELLMAN
. . . *Wellman president*



HOLLEY G. WELLMAN
. . . *Wellman vice pres.*


FOUNDRY SURVEY 19
FORD MOTOR CO. OF CANADA, LTD
SANDSLINGER INSTALLATIO
CENTRAL IRON FOUNDRY COMP
CLEANING AND FINISHING ROOM STUDIES
AMERICAN STEEL FOUNDRIES
FOUNDRY SURV
WEHR STEEL COMPANY
NEW FOUNDRY
FORD MOTOR CO. OF AUSTRALIA, PTY., LTD.
GEELONG, VICTORIA
GIFFELS & VALLET, INC
L. ROSSETTI
FOUNDRY SURVEY
ARMOR STEEL TANK TURRETS
SHELL MOLD FOUNDRY
LYNCHBURG FOUNDRY COMPANY
FOUNDRY SURVEY
SEALED POWER CORPORATION
FOUNDRY SURVEY
PERFECT CIRCLE COMPANY
INGOT MOLD & MAINTENANCE FOUNDRY
GIFFELS & VALLET, INC.
L. ROSSETTI
NEW IRON FOUNDR
FIAT
FOUNDRY SU
CANADIAN WESTINGHOUSE
GIFFELS & VALLET, INC.
L. ROSSETTI
SEE
WHAT They SAY
ABOUT
Giffels & Vallet
GIFFELS & VALLET, INC.
INDUSTRIAL ENGINEERING DIVISION
1000 Marquette Bldg. • Detroit 26, Michigan

H. E. EHLERS JR.
. . . *Joseph Dixon sales*

RALPH RATHYEN
. . . *Crucible Division mgr.*

CHARLES S. NORTHEN
. . . *U. S. Pipe sales*

ROBERT E. GARRETT
. . . *v.p., U. S. Pipe*

(*Continued from page* 122)
of California, was previously associated with York Corp., York, Pa.

♦ ♦ ♦

Carroll C. Parker has been named assistant manager of grinding wheel sales for the Mechanical Goods Division, United States Rubber Co., New York, with headquarters at the Fort Wayne, Ind., plant. Mr. Parker is a graduate of University of Maine and for 6 years has been in sales and service work in northeastern Ohio and western New York for the grinding wheel division of U. S. Rubber.

♦ ♦ ♦

H. L. Richardson has been named divisional sales manager of a new Pittsburgh office recently opened by Research Corp., Bound Brook, N. J. Mr. Richardson, with the company since 1936, will handle sales activities and engineering services in Pennsylvania and West Virginia for the company's line of electrostatic precipitators.

H. E. Ehlers Jr. has been appointed assistant general sales manager, and **Ralph Rathyen,** manager, Crucible & Refractories Division, Joseph Dixon Crucible Co., Jersey City, N. J. Mr. Ehlers was graduated from Lehigh University and joined the Crucible & Refractories Division of the company in 1935. He has been division manager since 1948. Mr. Rathyen joined the division in 1939 and has been assistant manager the past year.

♦ ♦ ♦

F. P. Strieter, recently chief of the casting section, metallurgical laboratories, Dow Chemical Co., Midland, Mich., has been named assistant superintendent of the die casting department, as assistant to **F. C. Bennett,** superintendent. Mr. Strieter was graduated from University of Michigan and, following two years at Chase Brass & Copper Co., Waterbury, Conn., joined Dow Chemical in 1942. He was previously assistant director of process development in the experimental foundry.

Charles S. Northen has been elected vice president in charge of sales, United States Pipe & Foundry Co., Burlington, N. J., succeeding **D. B. Stokes** who has retired following 42 years with the company. **Robert E. Garrett** has been named vice president-comptroller. Mr. Northen was graduated from Georgia Institute of Technology, and since 1945 he has been vice president-sales, Sloss-Sheffield Steel & Iron Co., Birmingham, subsidiary of U. S. Pipe. Mr. Garrett attended University of Alabama and has been associated with Sloss-Sheffield Steel & Iron Co. since 1929. He advanced through accounting departments and in 1945 was appointed executive assistant. Since 1951 he has been assistant to the president.

♦ ♦ ♦

Paul H. Goodell has been named sales manager, Catalytic Combustion Corp., Detroit. With a group of field engineers he will assist industrial plants in application of the company's process for low-temperature fume combustion. Mr. Goodell has been in the field of industrial heating for 15 years. He was previously associated with Jensen Specialties Inc., Detroit and the Trumbull Electric Department of General Electric Co., Schenectady, N. Y.

♦ ♦ ♦

Harlowe Hardinge, president, Hardinge Co., York, Pa., maker of heavy process machinery, was recently re-elected a director of the Pennsylvania State Chamber of Commerce. Mr. Hardinge has been a director for the past 4 years.

♦ ♦ ♦

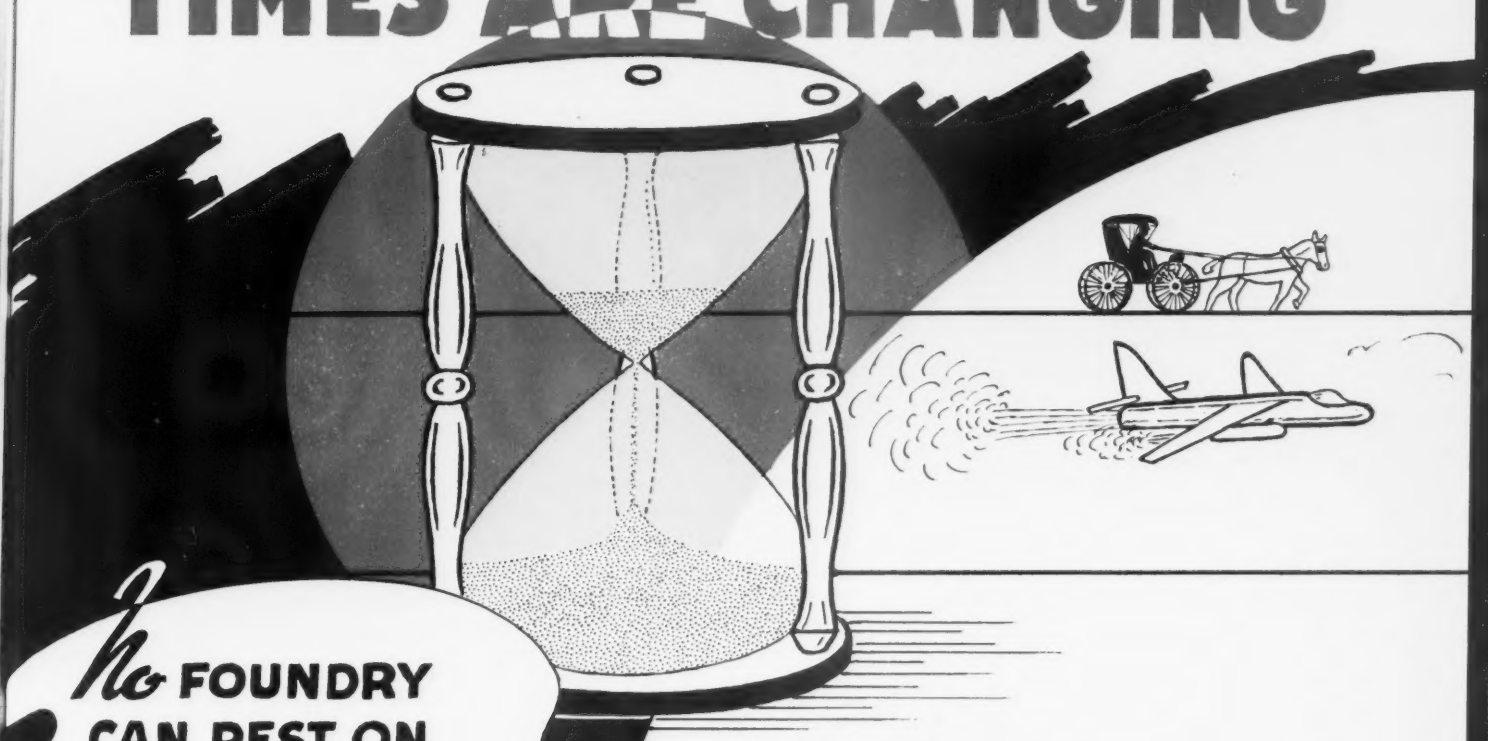
R. B. Miller, secretary-treasurer, Thew Shovel Co., Lorain, O., has retired, but will continue as a director. **Harry L. Reynolds** has been named

(*Concluded on page* 126)

H. L. RICHARDSON
. . . *Research Corp. sales*

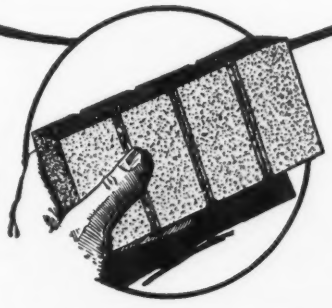
F. P. STRIETER
. . . *die castings, Dow*

As You Know
TIMES ARE CHANGING



No FOUNDRY CAN REST ON ITS LAURELS!

To meet competition, you must do things the most modern way. Your methods of production should be up to the minute to ensure better quality castings — to minimize rejects—and avoid make-over delays and late shipments.



Approx. 4 pound brick

ous Cornell Cupalo Flux is made in SCORED BRICK form easy and accurate use. You simply toss it into cupola with h ton charge of iron. Where charges run more or less, it s but a few seconds to break off one to three briquettes rter sections) as per instructions, to obtain the correct amount avoid waste.

Famous CORNELL CUPOLA FLUX

The metal cleanser that has eliminated the chief cause of many casting rejects (foreign matter in molten iron and improper fluidity) besides making castings sounder and cleaner.

Where Famous Cornell Cupola Flux is used, there is also a big reduction in sulphur, slag is kept fluid—and machining of castings is definitely easier and smoother.

Famous Cornell Cupola Flux increases efficiency in cupola operation and greatly reduces maintenance. Drops are cleaner, bridging over is practically eliminated—a feature that saves many man-hours of digging out and down time. Cupola linings need less patching because of protective glazed or vitrified surface which is formed on brick or stone.

Leading gray iron foundries, and malleable foundries with cupolas, are regular users, but still there are a few concerns who are unaware of its impressive pay-off to industry. If you are one of them—*investigate now.*

WRITE FOR BULLETIN NO. 46-B

The Cleveland Flux Co.

026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

ROBERT D. DODGE
. . . A-D-M representative

J. H. BRADLEY
. . . Holcroft vice pres.

(Concluded from page 124)

treasurer and Waid V. Clark, controller and secretary.

♦ ♦ ♦

Robert D. Dodge has been appointed sales representative in the Michigan area for the Foundry Products Division, Archer-Daniels-Midland Co., Cleveland. Mr. Dodge attended Michigan State University and was associated with Archer-Daniels-Midland Co. for two years prior to entering the Army in 950. He is the son of the late Frank H. Dodge, who was manager of the company's Detroit office for 32 years.

♦ ♦ ♦

John C. Alberts has rejoined the sales staff of the Machine Division, Osborn Mfg. Co., Cleveland, with headquarters in the Chicago office as representative in northern Indiana, northern Illinois, Iowa, Wisconsin and Minnesota. Mr. Alberts was graduated from Union College and joined Osborn's sales force in 1947. He became a sales engineer in 1949 and early in 1951 was recalled to active duty with the Air Force.

J. H. Bradley has been appointed vice president in charge of the Chicago office, Holcroft & Co., Detroit, succeeding **C. H. Martin,** who has resigned because of ill health. Mr. Martin will remain in the organization on special assignment and will continue on the board of directors. Mr. Bradley will manage the office at 4209 South Western Blvd., Chicago, for Holcroft & Co., designers and builders of heat treat furnaces.

♦ ♦ ♦

Richard T. Funnell has been appointed office manager and purchasing agent, Strong Steel Foundry Co., Buffalo, where he will handle purchase of all materal and supplies except office supplies and equipment, hardware and steel warehouse material.

♦ ♦ ♦

George P. Krumlauf has been appointed metallurgical engineer for the Pig Iron and Coal Chemicals Division, Republic Steel Corp., Cleveland, succeeding the late Thomas G. Johnston. Mr. Krumlauf attended Ohio State University and Franklin University and was previously engaged in metallurgical work with Hamilton Foundry & Machine Co., Hamilton, O., Altens Foundry & Machine Co., Lancaster, O., and in research for Battelle Memorial Institute, Columbus. During the war he was metallurgist with the Atomic Energy Commission's Manhattan Project, engaged in research on cast and wrought armor steels.

♦ ♦ ♦

Guy J. Coffey has been elected president, Chicago Pneumatic Tool Co., New York, succeeding the late W. L. Lewis. **H. A. Jackson** will continue as chairman of the board of directors and chief executive officer. **Thomas P. Harris** and **James F. Huvane** were elected vice presidents. Mr. Coffey joined the company in 1933 and in 1945 became a director and vice president in charge of sales.

♦ ♦ ♦

Robert D. Hill, vice president-treasurer, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has been elected executive vice president-treasurer. Formerly at the company's executive offices in Norwood, Cincinnati, Mr. Hill will now be located at High Bridge, N. J.

♦ ♦ ♦

J. J. McGrann, formerly sales engineer in the Los Angeles office, Timken Roller Bearing Co., Canton, O., has been transferred to the Houston, Tex., office of the company, succeeding **William Strickland,** who has been appointed sales engineer in Detroit. Mr. McGrann is a graduate of Ohio State University and joined the company in 1945, following military service. Mr. Strickland was graduated from Case Institute of Technology and has been with Timken for 6 years.

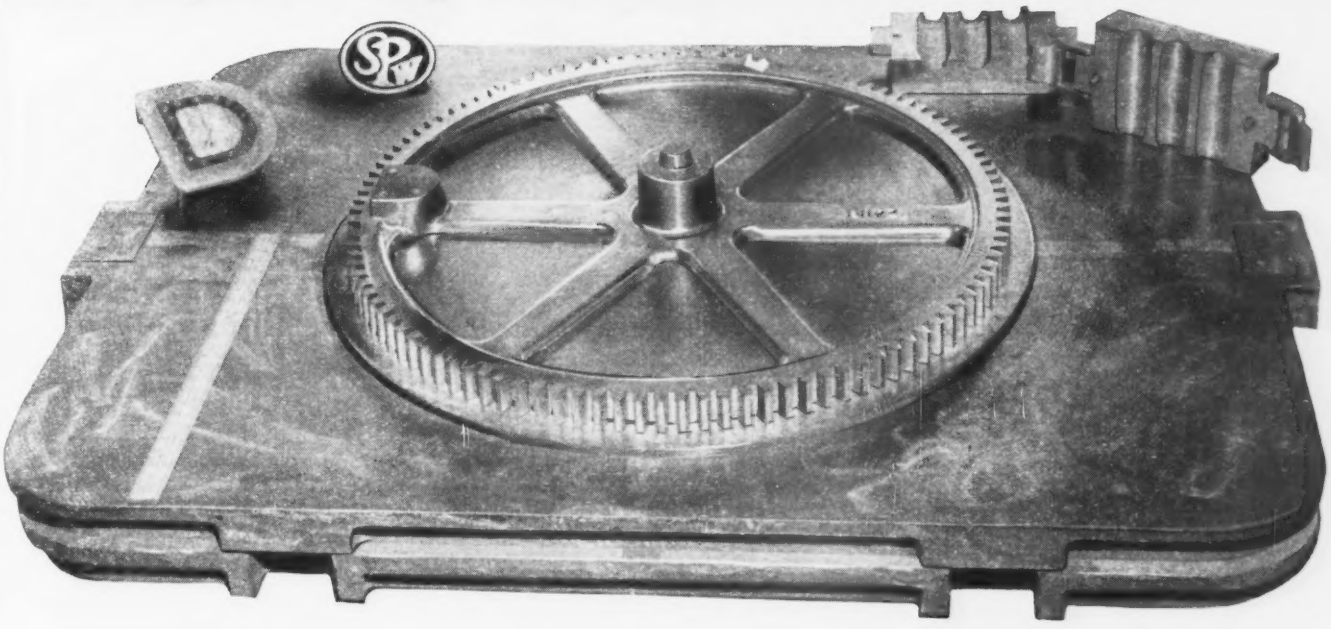
JOHN C. ALBERTS
. . . machine sales, Osborn Mfg.

GEORGE P. KRUMLAUF
. . . Republic Steel engineer

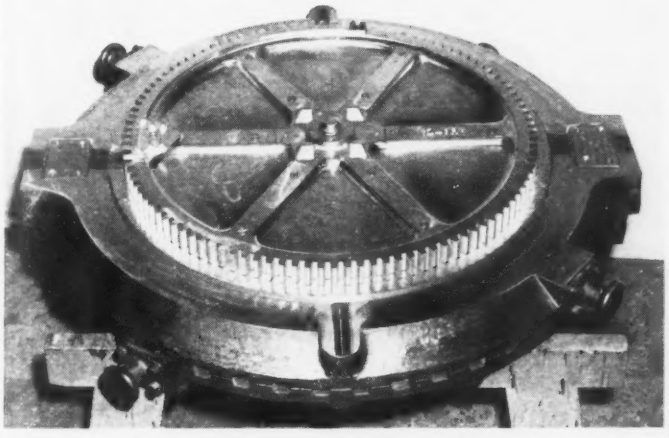
J. J. McGRANN
. . . Timken sales, Houston

WILLIAM STRICKLAND
. . . sales engineer, Detroit

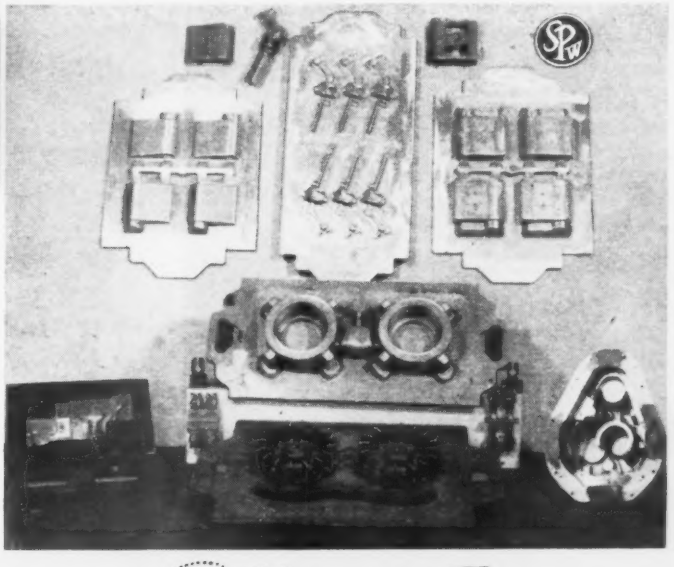
Completely Machined Patterns



Iron and Meehanite combination produced 55,000 pieces under *SANDSLINGER!*

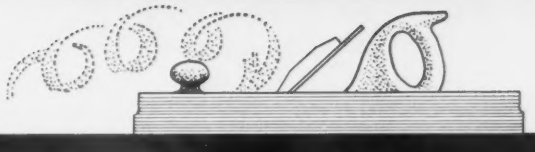


These 109-tooth iron and Meehanite cope and drag stripper patterns set up terrific production quotas in separate foundries. Completely machined equipments involving stripper-action, necessitating tolerances of .004 to .005 withstood sandslinger wear and made possible 55000 uniform pieces.

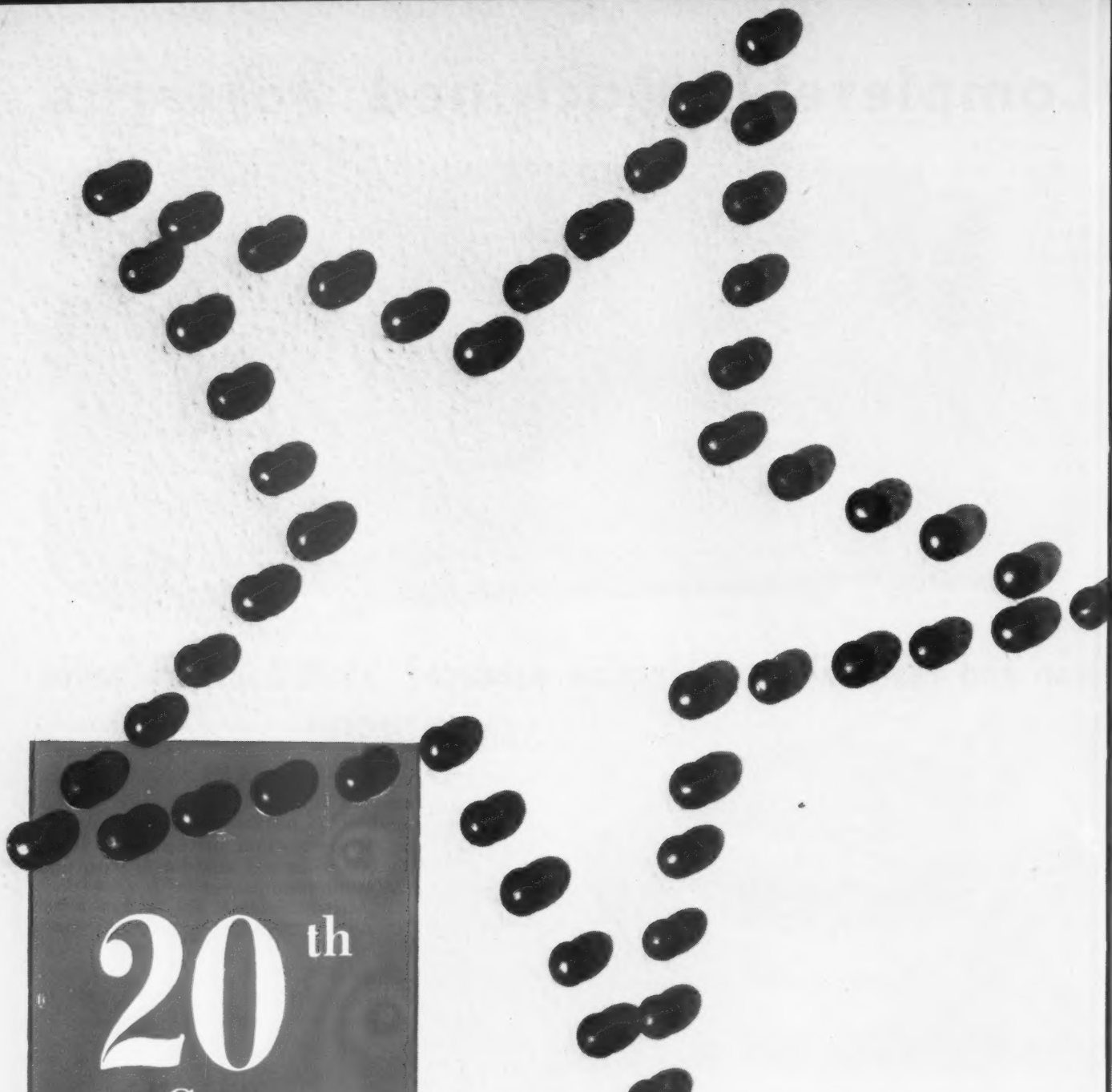


One Responsibility, from Engineering to Production

The Cleveland Standard Pattern watches production, from original engineering notes to final castings. We help with consultation, and treat each order as a project. We make a great variety of metal patterns, from the tricky bull-gear pictured above, to the assorted jobs illustrated at the right. Every pattern is based on experience gained since 1897—every pattern is mathematically and exactly formed—and all quotations are commensurate with our quality and service.



Cleveland STANDARD PATTERN WORKS, Inc.
5337 ST. CLAIR AVENUE CLEVELAND 3, OHIO



20th Century

the persuasive abrasive

Looking for a Star Performer?

20th Century* Normalized shot and grit will guarantee you top performance on four scores:

(1) Uniformity
(2) Toughness
(3) Economy
(4) Quality

A malleable abrasive, it's being used in foundries and metalworking plants everywhere.

Our new catalog is yours for the asking

**Copyrighted Trade Name*

THE CLEVELAND Metal Abrasive CO.

800 East 67th Street Cleveland 8, Ohio
Howell Works: Howell, Michigan

One of the world's largest producers of *quality* shot, grit and powder —Normalized—Hard Iron—Cut Wire

Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	920,502	512,192	.....
1951			
Sept.	82,276	48,568	244,575
9 mo.	827,102	498,600	.....
Oct.	93,884	58,251	238,019
Nov.	88,210	53,682	220,740
Dec.	76,045	45,543	215,134
Total	1,085,241	656,076	.....
1952			
Jan.	87,003	54,988	202,799
Feb.	82,898	50,129	193,061
Mar.	80,960	49,084	196,896
Apr.	89,270	56,337	198,215
May	81,770	51,476	180,382
June	74,446	46,511	173,353
July	45,266	29,675	166,517
Aug.	63,716	39,308	162,832
Sept.	75,950	45,849	168,367
9 mo.	681,279	423,357	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[3]
1950	543,082	184,782	181,366	167,201	.....
1951					
Aug.	45,207	17,813	14,452	11,767	117,888
8 mo.	380,582	140,007	124,454	108,919	.....
Sept.	41,864	16,490	11,793	12,293	112,973
Oct.	45,419	17,694	13,495	13,049	110,382
Nov.	41,661	16,278	11,725	12,604	116,044
Dec.	40,907	16,202	11,262	10,891	110,249
Total	550,433	206,671	172,729	157,756	.....
1952					
Jan.	46,424	18,051	12,236	13,884	109,654
Feb.	44,847	17,451	13,445	13,012	110,327
Mar.	46,448	19,017	13,673	12,880	104,749
Apr.	49,824	19,451	14,631	14,482	104,004
May	47,752	18,317	14,292	13,907	100,802
June	45,310	18,452	11,982	13,860	103,685
July	40,091	16,342	10,866	12,341	106,673
Aug.	46,761	18,477	12,397	12,884	112,852
8 mo.	367,430	145,558	103,522	107,250	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Perm. Mold	Unfilled Orders[3]
1950	1,056,973	953,590	55,614	.....
1951				
Aug.	95,024	84,503	5,422	84,821
8 mo.	816,258	733,135	47,212	.....
Sept.	89,567	79,676	5,493	84,611
Oct.	99,305	88,332	6,237	82,491
Nov.	92,102	82,270	6,043	82,667
Dec.	80,259	72,813	4,958	80,294
Total	1,177,541	1,056,226	69,943	.....
1952				
Jan.	89,616	80,376	6,233	78,316
Feb.	86,231	77,813	5,204	75,279
Mar.	88,642	79,437	6,182	72,463
Apr.	84,460	75,590	5,914	70,602
May	81,903	73,723	5,420	70,252
June	75,359	67,748	4,858	70,797
July	64,762	58,931	3,637	74,739
Aug.	77,094	70,030	4,830	73,925
8 mo.	648,067	583,548	42,278	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[3]
1950	15,224	13,310	.....
1951			
Aug.	2,957	2,543	16,095
8 mo.	20,745	18,057	.....
Sept.	2,551	2,306	16,407
Oct.	2,977	245	16,143
Nov.	3,946	2,954	15,550
Dec.	2,916	2,525	14,729
Total	33,135	28,596	.....
1952			
Jan.	3,569	3,083	14,047
Feb.	3,368	2,940	14,459
Mar.	3,319	2,972	13,279
Apr.	3,051	2,751	13,244
May	3,002	2,698	13,041
June	2,948	2,699	12,094
July	2,654	2,393	12,948
Aug.	2,722	2,486	13,178
8 mo.	24,633	22,022	.....

Foundry Production Workers

Estimated Number

	Aug. 1952	July 1952	Aug. 1951
Ferrous	228,900	221,100	249,600
Nonferrous	92,800	92,200	90,500

Average Weekly Earnings

	Aug. 1952	July 1952	Aug. 1951
Gray Iron	$68.58	$64.33	$68.31
Malleable Iron	66.43	64.81	71.43
Steel	73.95	74.86	76.25
Nonferrous	75.81	73.90	73.29

Average Weekly Hours

	Aug. 1952	July 1952	Aug. 1951
Gray Iron	39.8	38.5	41.2
Malleable Iron	34.3	36.7	41.7
Steel	40.7	41.2	43.3
Nonferrous	40.8	40.1	41.5

Labor Turnover Rate (Aug.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.8	3.8	2.6	0.6
Malleable Iron	5.0	3.9	2.6	0.2
Steel	5.0	4.5	3.2	0.5
Nonferrous	6.2	4.6	2.7	1.1

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	Miscellaneous Castings Total	Miscellaneous Castings For Sale	Heavy Steel Ingot Molds Total	Heavy Steel Ingot Molds For Sale	Chilled Railroad Car Wheels Total	Chilled Railroad Car Wheels For Sale	Pressure Pipe & Fittings Total[2]	Soil Pipe & Fittings Total[2]	Unfilled Orders Total[3]
1950	12,905,562	6,880,352	8,117,748	3,415,281	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
Sept.	1,114,789	625,511	704,657	328,331	204,856	96,011	45,467	41,360	111,893	47,916	2,055,392
9 mo.	11,470,242	6,463,531	7,372,679	3,450,264	1,942,367	939,378	496,471	435,549	1,104,023	554,154	.....
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
Dec.	1,032,799	582,614	646,352	309,696	204,911	94,857	41,594	38,119	108,767	31,175	1,847,065
Total	14,988,555	8,453,048	9,573,347	4,471,539	2,614,517	1,257,542	639,996	563,272	1,473,192	687,503	.....
1952											
Jan.	1,199,285	694,498	745,548	359,806	225,704	110,263	57,155	53,551	125,729	45,149	1,800,905
Feb.	1,155,143	654,833	733,067	348,855	219,251	105,918	50,444	47,649	107,669	44,712	1,766,434
Mar.	1,172,017	660,920	723,225	334,492	228,799	110,607	53,919	49,747	115,843	50,231	1,711,037
Apr.	1,204,801	652,962	773,538	347,121	204,805	85,239	48,506	42,650	117,929	60,023	1,614,426
May	1,100,630	620,049	698,332	317,150	186,998	91,980	44,229	39,848	117,586	53,485	1,459,305
June	835,263	502,322	616,895	292,846	19,467	10,575	44,066	44,066	103,335	51,500	1,445,521
July	636,141	431,889	427,475	227,794	14,794	10,223	40,783	40,783	96,784	56,305	1,409,684
Aug.	1,001,629	602,025	596,369	295,861	198,816	99,760	35,606	35,606	108,313	62,485	1,513,166
Sept.	1,119,373	625,680	676,732	309,299	230,219	107,987	39,912	35,884	107,847	64,663	1,450,723
9 mo.	10,424,282	5,445,178	5,981,181	2,832,894	2,528,853	732,552	414,620	389,784	1,001,035	468,553	.....

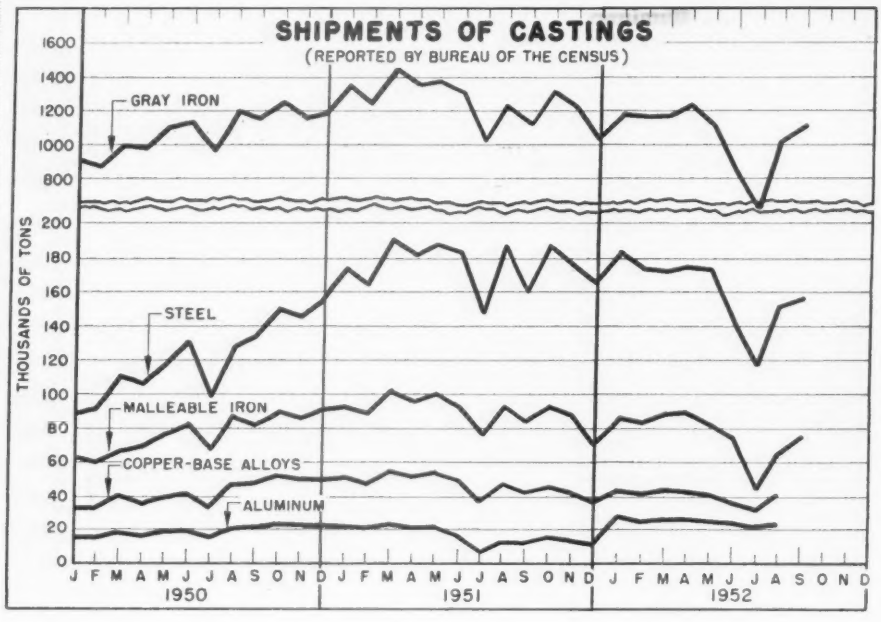
Steel Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[3] Total
1950	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
Sept.	160,635	116,658	35,500	120,632	89,711	33,086	40,063	26,887	2,414	918,038
9 mo.	1,518,287	1,212,226	357,941	1,156,564	873,700	318,987	361,723	238,466	38,854	.....
Oct.	189,929	139,953	39,994	138,610	104,449	36,488	51,319	35,504	3,496	891,508
Nov.	176,728	131,276	35,034	126,544	95,180	31,099	50,184	36,096	3,935	865,029
Dec.	165,110	123,448	33,213	119,762	89,208	29,341	45,348	34,150	3,872	846,436
Total	2,050,054	1,506,903	466,172	1,541,280	1,162,687	415,915	508,574	344,216	50,157	.....
1952										
Jan.	183,738	139,488	37,091	133,985	102,265	31,806	49,753	37,223	5,285	869,299
Feb.	174,626	133,602	31,719	125,484	94,969	28,251	49,142	38,633	3,468	856,872
Mar.	173,694	131,997	32,118	125,787	95,206	27,782	47,907	37,196	4,336	857,115
Apr.	175,075	134,325	33,549	126,628	97,128	29,798	48,447	37,654	3,751	842,970
May	173,635	132,129	35,227	125,309	95,816	30,995	48,326	37,129	4,223	804,695
June	141,628	114,410	30,455	101,850	84,388	26,815	39,778	30,818	3,640	846,459
July	119,036	97,633	20,752	81,576	67,600	18,694	37,460	30,329	2,058	855,046
Aug.	150,232	113,997	24,498	107,203	80,877	21,626	43,029	33,120	2,872	809,354
Sept.	158,392	121,402	20,686	109,011	82,557	17,843	49,381	38,845	2,843	781,929
9 mo.	1,360,056	1,118,983	266,175	1,036,833	800,806	233,610	413,223	321,431	32,476	.....

[1] Source: Bureau of Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.

(Concluded on page 130)



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1951	1952
Jan.	668.0	404.5
Feb.	638.6	200.4
Mar.	599.0	310.0
Apr.	490.1	385.1
May	431.7	225.2
June	393.2	353.8
July	390.3	343.9
Aug.	404.5	311.6
Sept.	346.5	365.9
Oct.	372.4	335.8
Nov.	305.5	....
Dec.	230.5	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1950	72,718,038	73,373,618	3,522,396
1951			
Oct.	6,742,767	6,727,211	292,737
10 mo.	66,030,267	65,494,399	3,142,577
Nov.	6,501,098	6,562,279	272,333
Dec.	6,738,759	6,821,446	249,490
Total	79,133,744	78,868,124	3,664,404
1952			
Jan.	6,804,106	6,760,011	261,148
Feb.	6,358,715	6,411,905	251,125
Mar.	6,779,639	6,743,944	264,488
Apr.	5,806,153	5,770,711	261,972
May	5,961,757	5,882,922	253,605
June	2,472,940	1,772,203	219,909
July	2,376,019	1,621,308	166,377
Aug.	6,039,749	6,204,539	232,249
Sept.	6,180,804	6,517,682	269,029
Oct.	6,461,559	6,802,649	276,353
10 mo.	55,251,420	54,487,874	2,224,106

Ingot Brass and Bronze

(Shipments in net tons)

	1951	1952
Jan.	28,416	28,315
Feb.	27,168	24,211
March	31,997	23,890
Apr.	30,472	22,547
May	33,267	21,740
June	33,817	21,274
July	32,016	18,947
Aug.	25,285	21,807
Sept.	22,285	22,770
Oct.	23,124	25,811
Total for year	332,378	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1950	579,332	376,681	.....
1951			
Aug.	41,045	25,946	80,588
8 mo.	292,961	190,958	.....
Total	494,960	328,183	.....
1952			
Mar.	35,083	23,413	67,846
Apr.	37,312	23,441	63,753
May	35,775	22,410	62,397
June	33,829	21,433	60,719
July	23,462	16,055	57,666
Aug.	29,955	18,794	57,333
8 mo.	301,579	195,289	.....

Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1950	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
Oct.	6,112.6	260.6	299.4	4,777.4	752.2	5,601	489	31	14
10 mos.	58,542.0	2,653.4	2,580.3	45,949.5	7,358.8	53,181	4,882	297	116
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	5,282	401	28	11
Total	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Jan.	5,964.3	233.1	285.8	4,672.3	773.1	5,452	466	29	14
Feb.	5,701.8	245.2	261.4	4,496.9	698.3	5,139	441	29	11
Mar.	6,226.2	250.3	273.1	4,895.9	806.9	5,552	433	27	7
Apr.	5,170.0	243.8	218.5	4,069.9	638.0	4,714	446	28	8
May	5,414.2	245.4	236.0	4,295.6	637.2	4,823	412	25	8
June	1,043.2	133.7	103.1	758.6	47.7	991	342	20	5
July	981.6	119.7	118.3	712.9	30.7	845	250	12	8
Aug.	5,767.3	262.9	280.6	4,553.8	669.9	5,063	423	9	8
Sept.	6,069.3	294.7	306.6	4,757.0	710.9	....	....	....	....
Oct.	6,415.3	280.0	299.4	5,091.6	744.2	....	....	....	....
10 mos.	48,753.2	2,309.3	2,382.8	38,304.5	5,756.5	....	....	....	....

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap Total	All Scrap Purchased	By Types of Furnace: Cupola Total	Cupola Purchased	Air Total	Air Purchased	Electric Total	Electric Purchased
1950	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
Aug.	5,614,535	2,721,287	918,180	487,085	104,809	37,592	720,020	475,190
8 mo.	46,191,670	23,054,453	7,745,728	4,096,971	829,574	302,700	5,525,915	3,599,188
Sept.	5,377,491	2,585,665	811,332	427,035	93,166	33,640	688,941	460,446
Oct.	5,869,590	2,826,221	951,406	504,804	102,950	38,534	750,915	489,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	489,999
Dec.	5,483,089	2,656,536	738,150	398,538	87,748	32,430	687,559	450,155
Total	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005
1952								
Jan.	5,847,011	2,788,426	846,891	449,935	101,211	38,150	743,233	470,126
Feb.	5,572,506	2,702,092	789,293	419,279	94,900	35,536	697,319	440,325
Mar.	5,902,529	2,860,364	791,165	415,853	92,751	35,013	741,793	475,161
Apr.	5,360,417	2,657,926	834,066	440,035	106,059	38,888	684,318	427,339
May	5,369,258	2,660,471	779,436	404,899	94,597	35,966	700,617	455,460
June	2,048,951	1,169,102	719,739	374,127	82,357	30,412	285,596	173,740
July	1,965,007	1,156,296	524,651	278,750	52,999	19,733	364,536	244,944
Aug.	5,470,696	2,738,593	721,255	348,181	74,351	28,091	682,405	446,543
8 mo.	37,536,375	18,733,270	6,006,496	3,104,059	699,225	261,789	4,899,817	3,133,638

* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.

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ALL-CANADIAN FOUNDRY CONFERENCE

Draws More Than 400 to Montreal

By ROBERT H. HERRMANN
Associate Editor
FOUNDRY

MORE than 400 attended the fourth All-Canadian Foundry Conference Nov. 6-8 at Montreal. Technical sessions covering gray iron, steel, and nonferrous metals were held at Montreal Technical School and Sheraton Mount Royal Hotel, with the Thursday luncheon and Friday banquet also at the hotel. Visitations drew 352 on Thursday afternoon and Friday morning to six plants officially open to visitors.

Conference Chairman A. E. Cartwright, Crane Ltd., Montreal, presided at the opening luncheon to introduce C. Houde, mayor of Montreal. In his address of welcome Mr. Houde remarked on the growth of the Canadian foundry industry, foreseeing for it a bright future in the rapidly expanding national economy. Walter L. Seelbach, president, Superior Foundry Inc., Cleveland, and immediate past national AFS president, outlined the aims and policies of the society.

Brief talks were made by A. J. Moore, Montreal Bronze Ltd., Montreal, Eastern Canada chapter chairman, and Alex Pirrie, Standard Sanitary & Dominion Radiator Ltd., Toronto., vice chairman of Ontario chapter. These two chapters were cosponsors of the conference.

The regular monthly meeting of Eastern Canada chapter at Montreal Technical School on Thursday evening was incorporated in the conference program, with W. W. Werry, school vice principal, welcoming the guests. Mr. Seelbach expanded his lunch-time comments on the importance of AFS work, scope of the work and how it is done. The third film in the series on fluid flow in transparent molds prepared under the sponsorship of the AFS was shown with commentary by S. C. Massari, AFS technical director.

Entitled "Effects of Gating on Casting Quality," the film briefs data presented in the previous films on behavior of water in transparent lucite molds and presents new data on the effect of sprue base design on air entrapment in the fluid. Runner size and shape also is covered. A circular enlargement at the base of the sprue with a deep well in the drag just under the sprue in molds with either wide, shallow runners or narrow, deep runners is shown to be the best design in eliminating turbulence and entrapment of air into the mold. If the well is not possible because of mold design, use of the enlargement at the sprue base in conjunction with narrow, deep runners is second best.

Speaker at the two gray iron sessions was Tom W. Barlow, Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago. His topic for both sessions was "Cupola Practice." At the first session he covered cupola design, basic and acid refractories and the importance of refractories from a metallurgical point of view, advantages and disadvantages of hot and cold blast and tuyere and windbox design. Proper procedures for efficient cupola operation and how to correct difficulties when they arise, coke ratios, the importance of air as part of the charge and control of temperature and carbon were discussed at the second session.

In his discusion on tuyeres Mr. Barlow described water-cooled inserted tuyeres, saying that they are important in basic cupola operation in controlling iron oxide content of the slag. Also they keep the blast from going up cupola sidewalls or behind the brick and introducing oxygen high up in the cupola. With respect to refractories the speaker stated that the diameter of a cupola is larger at the end of a day's operation because of lining burnout. To avoid getting cold iron, metal, coke and air charges should be changed to give optimum results in the "larger diameter" cupola.

Good refractory practice, however, will minimize burnout. The best refractory is one that reacts with the slag to form a viscous slag coating on cupola walls and still lets some slag run out the slag hole. In that way the melt runs against the slag wall cushion and refractory burnout is kept to a minimum.

(*Concluded on page* 134)

View of part of the inaugural luncheon head table. From left to right are: Harold J. Roast, consulting chemist and metallurgist and past national director of the AFS; R. W. Bartram, Robert W. Bartram Ltd.; J. H. Dougherty, Canada Iron Foundries Ltd.; Hugh Crombie, Dominion Engineering Works Ltd.; J. J. F. Bancroft, Jenkins Bros. Ltd.; S. C. Holland, Robert Mitchell Co.; Alex Pirrie, Standard Sanitary & Dominion Radiator Ltd. and vice chairman, Ontario Chapter of AFS; A. J. Moore, Montreal Bronze Ltd. and chairman, Eastern Canada Chapter of AFS, and A. E. Cartwright, Crane Ltd., conference chairman

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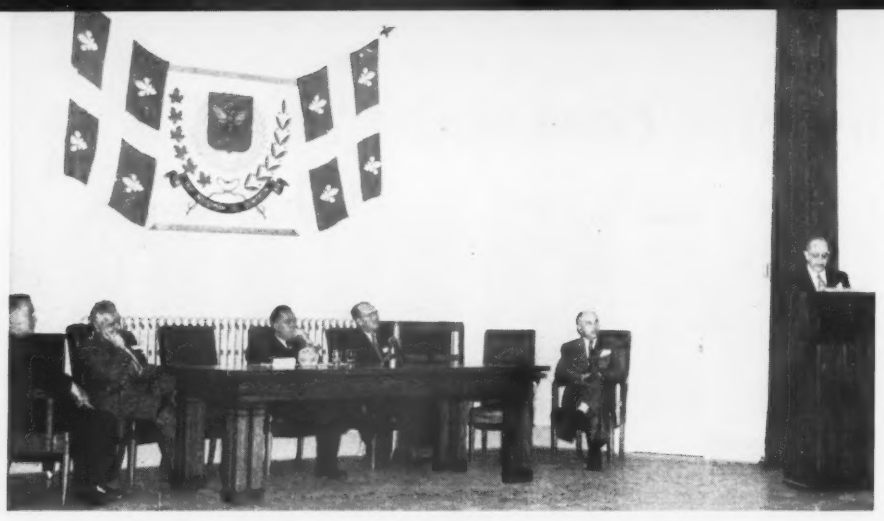

Speakers at the Thursday evening technical session were, left to right: W. W. Werry, vice principal, Montreal Technical School; Alex Pirrie, vice chairman, Ontario Chapter, AFS, discussion leader; A. J. Moore, chairman, Eastern Canada Chapter, AFS; Morris McQuiggan, technical chairman; S. C. Massari, technical director, AFS, technical speaker, and Walter L. Seelbach, immedicte past national AFS president, who delivered the opening address for the conference

(*Concluded from page* 132)

According to the speaker, many foundrymen run both metal and coke charges too big. Small charges made more often are better from an efficiency standpoint. Properly operated cupolas have an efficiency of about 37 per cent while efficiency of poorly run cupolas may go as low as 15 per cent. He went on to say that air is as much a part of the charge as metal and coke. Optimum results are obtained with 0.18 lb per minute per square inch of cupola cross-sectional area at the melting zone. If volume of air is higher or lower the cupola will use more coke. Higher air volume will produce a harder iron for any given composition.

In conclusion, Mr. Barlow stated that there is no standard ratio between cupola diameter and coke size. The size of coke depends on its type and quality and the iron composition that the operator is trying to obtain.

John W. Juppenlatz, Lebanon Steel Foundry, Lebanon, Pa., spoke at the two steel sessions. "Acid Electric Melting" was the subject of the first session. The speaker emphasized the importance of slag in indicating condition of the melt and stressed the point that characteristics of the metal can be controlled through proper slag control. He discussed the use of a viscosimeter for slag control and touched upon quantitative analysis of slag.

For degassing Mr. Juppenlatz favors a long boil in the conventional manner for removing hydrogen and nitrogen. With an oxygen lance the boil is of too short duration and nitrogen content of the melt is reduced insufficiently.

He commented briefly on basic steels, saying that they have about the same fluidity as acid steels. His experience has shown that basic steels give a higher V-notch Charpy impact strength, although other properties are about the same as those of acid steel.

Subject of the second steel session was "Molding Methods," with added remarks on hot tears. Mr. Juppenlatz stated that shrinkage and hot tears are the same, except that where a mold restriction exists the casting develops a hot tear. With no mold restriction only shrinkage occurs. Internal tears are caused by temperature gradients resulting from not allowing sufficient molten metal to take care of solidification shrinkage. In conclusion, Mr. Juppenlatz suggested some practical solutions to problems of molding and hot tearing. He considers proper casting design of major importance in eliminating many problems.

Two speakers addressed the first nonferrous session. M. J. Davison, Canada Metal Co., Toronto, spoke on "Getting the Most out of Bronze." Mr. Davison discussed volume changes which occur as copper-base alloys solidify. He indicated that decreases in volume of this nature occur on three stages—liquid contraction, freezing shrinkage and solid contraction. A relationship then was shown between shrinkage characteristics and alloy composition, and association of various types of shrinkage defects to casting design and location of risers and chills was pointed out.

The speaker then explained the theory of absorption of gases in molten copper-base alloys and the reactions that take place after such gases have been absorbed. He went on to show how casting unsoundness could result from expulsion of those gases and gas products during cooling of the molten metal.

Second speaker at the session was M. W. Martinson, Light Alloys Ltd., Renfrew, Ont. His topic was "Comparative Foundry Characteristics of Magnesium and Aluminum." The speaker outlined the characteristics and properties of various aluminum and magnesium alloys, stressing the importance of proper design of castings to be made with these metals and of specifying the correct alloy for the casting use involved. Melting techniques and pouring practices to be followed for the two metals were discussed.

Mr. Martinson described tests for determining whether or not a given melt had picked up gas and outlined degassing and grain refining techniques. He concluded with a comprehensive discussion of proper gating and risering techniques and of the importance of using proper types of molding sand for optimum results.

The concluding nonferrous session also featured two speakers. H. H. Fairfield, William Kennedy & Sons Ltd., Owen Sound, Ont., described "Rapid Tests for Melt Quality During Melting Operations." Tests discussed by the speaker were those that can be used to show melt quality of brass, bronze, iron and steel. Particular emphasis was placed on a button test used in connection with manganese bronze melts. The test is based on determining the hardness of a cast button and using the relationship of that hardness value to the tensile strength in order to indicate what additions of zinc or aluminum, if any, are necessary to provide the proper strength.

Collaboration Is Needed

G. J. Ramsden, Ramsden Mfg. Co., London, Ont., spoke on "Mold Design as Related to Permanent Mold Castings" to conclude the nonferrous sessions. Mr. Ramsden stressed the necessity for engineers designing permanent mold castings to consider certain restrictions and factors that must be observed and suggested that best design is achieved if casting designer and mold designer collaborate during the planning stage of development. The necessity of providing generous fillets at all internal and external corners was emphasized.

The speaker described the types of material best suited to the manufacture of permanent molds, and, in discussing methods of getting the metal into the mold and castings out, he stressed the importance of proper mold coatings and appropriate mold and metal pouring temperatures.

The film "The Invisible Shield," produced by Claude B. Schneible Co., Detroit, was shown at each of the group sessions. It explains operating principles of various types of equipment employed to control dust and fumes in the modern foundry.

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Here's a bonding clay that's almost as light and fine as flour — possibly the finest bonding clay available anywhere. Mined from our own pits, artificially dried, and ground to velvet dust, it has found favor with discriminating foundrymen everywhere. Moreover, it is available at any time of the year, all year long—and it keeps its high qualities. While it is a very superior clay for bonding sand, it has many other foundry uses. A foundryman doesn't have to think very long before he can find dozens of applications for this velvet-fine AIRFLOATED CLAY. We can ship it anywhere in a hurry: just tell us about your schedules, and we'll do the rest.

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CEDAR HEIGHTS CLAY CO.

50 PORTSMOUTH ROAD
OAK HILL, OHIO

1

SPIC and SPAN Foundry

QUADRUPLES TONNAGE

In Five Years

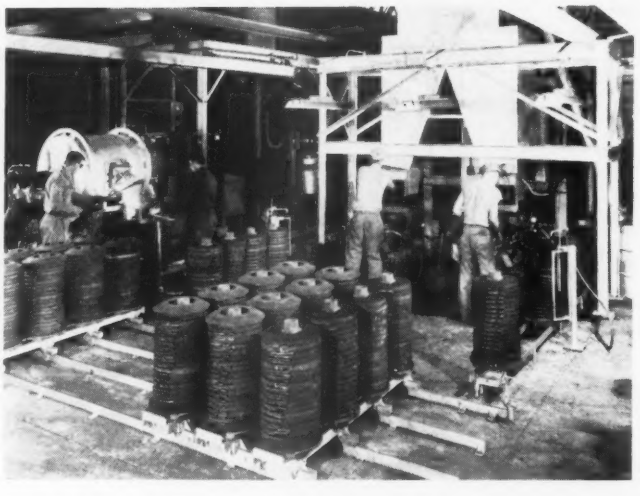
2

DURING the last five years, Wells Mfg. Co., Skokie, Ill., has increased its foundry tonnage from 12 to 50 tons per day. Total floor area of the plant has been increased from 38,000 to 72,000 sq ft, 50 per cent of it molding area, a view of which is shown in Fig. 4.

Fig. 1 is a front view of the firm's new offices and pattern and maintenance departments. Fig. 2 shows one corner of the chemical and physical testing laboratory, which was formerly the general office.

Fig. 3 illustrates stack molding and electric furnace pouring operations for making valve seat inserts. This compact unit is capable of producing a large volume of valve seat inserts per day, taking in a range of analysis from moly-chrome irons to Ni-Resist. Molding sand is carefully prepared, controlled and tested in the sand laboratory to insure fine surface finish on castings.

The company originally had one 54-in. ID cupola, but now has two, plus three indirect arc electric furnaces, two of which are 2000-lb furnaces, the other 1000-lb. A small induction furnace also was added recently to produce castings of high alloy content which must meet exacting specifications.



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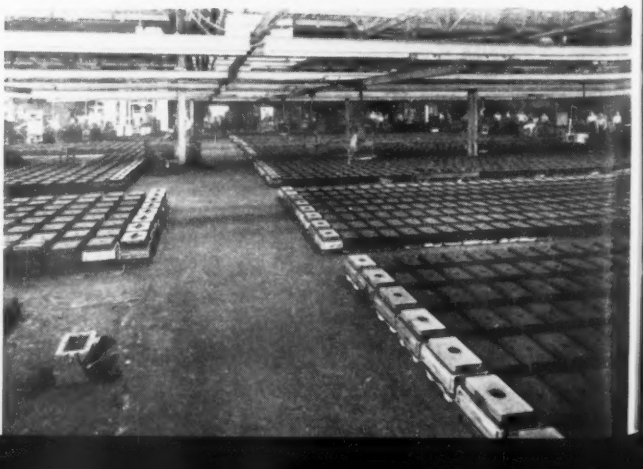
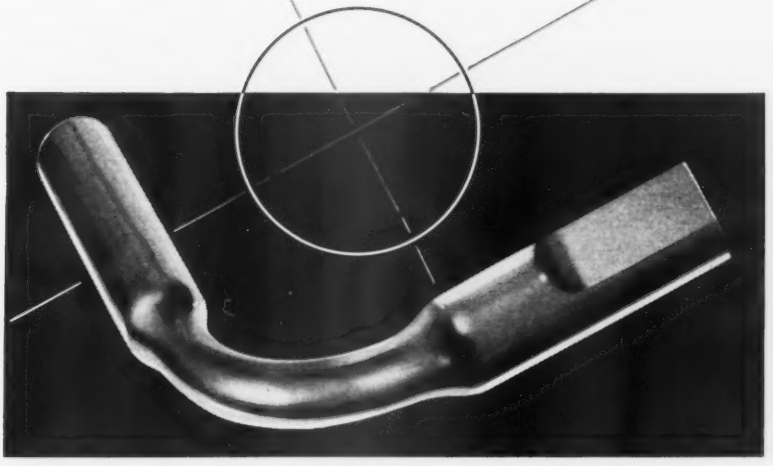


4

14.75% ELONGATION

ALMAG 35

ALUMINUM ALLOY



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40,940 LBS./SQ. IN.

Standard sand-cast test bars of ALMAG 35, bent beyond 90 degrees as shown, show no sign of fracture under closest microscopic examination.

This critical test graphically demonstrates ALMAG 35's superior ability to withstand severest punishment. Tough but pliable, ALMAG 35 possesses minimum 9% and typical 13-15% elongation . . . five to seven times that obtained in conventional alloys.

ALMAG 35 offers you the highest, most stable combination of tensile strength, impact resistance and ductility of any *as-cast* aluminum alloy.

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AURORA, ILLINOIS

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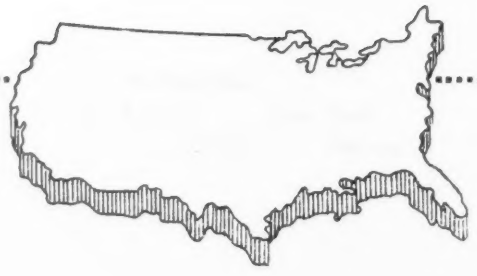
AROUND THE COUNTRY

News Reports from . . .



Los Angeles

FOUNDRYMEN are cautiously optimistic regarding 1953 business prospects. Aided by a fourth quarter spurt in business, 1952 ended up only about 10 per cent under the 1951 level. With materials plentiful, and facing no major problems, foundrymen enter the new year confident that business will be at least as good as or better than 1952.

At the beginning of the fourth quarter, steel foundries were booking new orders at 89 per cent of capacity. Per cent production of maximum demand stood at 81 per cent. During the fourth quarter the increase in melt for ferrous foundries averaged 15 to 20 per cent over the preceding quarter. Steel foundries currently are operating at 80 to 85 per cent of capacity compared with 75 per cent for the first nine months of 1952.

Foundrymen are not agreed as to what caused the spurt; some think the reason was the resumption of activity following the steel strike, others say it is the result of generally better business conditions.

Foundrymen expect somewhat keener competition for business in 1953 but they say they stepped up sales activities last year and that no greater selling effort is planned.

Smaller profit margins are anticipated this year. Due to higher costs of materials and labor, foundry earnings in 1952 were lower than in 1951. For some, earnings were off as much as 20 per cent. Foundrymen are indignant over the overriding of the WSB recommendation by President Truman in the coal case. Industry spokesmen point out that this action spurs costs of coal and associated products, while castings are still held to OPS ceiling prices. To correct price inequities, foundrymen hope for an end to controls. Removal of all price controls in the foundry industry, they argue, will not raise casting prices by more than 3 to 5 per cent. Competition, they say, will keep a tight lid on increases.

Philadelphia

GRAY IRON shops, now in the midst of the year-end lull, are looking for a pick-up after the turn of the year. But whether the improvement will lead to better operations than before the current lag set in is still a question. Most gray iron foundries entered December with operations at about 70 per cent of normal. Some were working a five-day week, but with reduced forces and curtailed daily hours. Few had any appreciable backlogs. Various shops planned long holiday week-ends.

Machine tool casting business of jobbing shops has been off for some little time. Today there is very little sub-contracting by the builders, although their own shops continue fairly busy. One notable exception is in grinding machines. There is little defense work of importance.

Steel casting shops are in a generally better position than the gray iron foundries, as has been the case for months. They are still operating at full capacity five days a week and in some instances into the sixth day. However, demand is off some and backlogs are lower at around 12 to 14 weeks. Defense and indirect defense work is providing steel foundries with the bulk of their business. The two district cast armor plants are working at capacity; and there is considerable power plant business.

Situation in malleable is now only a step or two better than in gray iron and definitely much poorer than in steel. Few, if any, are operating at capacity, and backlogs generally are slim. Some betterment in the overall picture is expected after the turn of the year, particularly if the agricultural implement people start building up stocks for spring and summer demand, as is now contemplated.

District aluminum shops are active, also the districts' one major magnesium shop, business being stimulated in particular by defense requirements. Business among brass shops is spotty.

Raw material supplies are adequate and this is even true with regard to most alloys, nickel being scarce and virtually the only exception.

Chicago

A YEAR ago foundries were experiencing difficulty getting enough pig iron to meet melting requirements. Currently, there's enough to go around although it can hardly be said supply is plentiful. Sellers still follow quotas in accommodating their customers, but there is more give and take. Users long since have lost interest in foreign iron or out-of-the-district offerings that entail extra freight.

The better balance in demand and supply has a two-fold explanation. In the first place, foundry operations haven't been as strong as a year ago, lessening the need for iron. Secondly, blast furnaces have made more of their production available for sale. A third factor had some bearing too. Foundries of International Harvester Co. were strike-bound for a long period in late summer and fall. The company's blast furnaces were not affected—not even by the big steel strike—with result that some of the iron its own foundries normally consume was sold outside.

However, the biggest lift in the improved situation came from a commendable co-operative arrangement which two competing steelmakers

(*Concluded on page* 140)

HANDLING "TOUGH" MATERIALS?-

A 60′ Carrier Natural-Frequency screening conveyor for clay products, with 24″ pan made of ¼″ steel plate.
Capacity: 100 tons of 100-pound material per hour. 5 H.P. drive. Middle section of screen removed to show supporting bridge.

Close-up of drive — note patented drive linkage which always places weight of vibrating pan and conveyed materials on the spring supports, and never allows these loads to be imposed on the eccentric shaft and bearings.

anything that's hot, sharp, powdered, oily, abrasive, sticky, granulated or stringy?

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- **LESS POWER REQUIRED**
  (1000 foot-tons per hour per H.P.)
- **LESS MAINTENANCE & DOWN-TIME**
  (Less power + good design = good service)
- **GREATER CAPACITY**
  (From a dribble up to 200 tons per hour)
- **HIGH CONVEYING SPEED**
  (Up to 100 feet per minute, on flat hauls)
- **NO DAMPENING UNDER LOAD**
  (Designed with extra power for specified load, with positive stroke)
- **SELF CLEANING**
  (Continuous smooth trough —no pockets)
- **SCREENS, DEWATERS, SEPARATES, BLENDS, DRIES, COOLS**
  (Combines processing with conveying)
- **WIDTHS FROM 6″ TO 48″; LENGTHS FROM 5′ ON UP**
  (With pans 16 gauge to ½″ plate or heavier, open or enclosed)
- **BALANCED, VIBRATION-FREE UNITS AVAILABLE**
  (For use on ceilings or light floor construction)

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NATURAL-FREQUENCY
CONVEYORS

Carrier Natural-Frequency Conveyors work on a unique, patented vibrating principle which permits them to handle many materials that are too "tough" for most screw, belt, apron, vibrating and other conventional types of conveyors. These spectacular new conveyors also substitute the natural resonance action of coil springs for brute force. Result—*a tremendous reduction in power . . . far less wear-and-tear . . . and an absolute minimum of maintenance and down-time!*

Carrier Natural-Frequency Conveyors — including vertical vibrating spiral types — are now racking up amazing conveying records for scores of America's biggest, most successful industrials. Let us prove to you that they will move *your* product more quickly, efficiently and economically. *Mail the coupon — no obligation of course!*

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Frankfort Avenue at Clifton, Louisville 6, Kentucky

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Firm_____

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City_____ State_____

Att. Mr_____ Dept._____

(*Concluded from page* 138)

here— Inland Steel Co. and United States Steel Co.—worked out, by which the former "loaned" the latter one of its blast furnaces. The deal was made to speed recovery of steel production to capacity levels following end of the steel strike in August.

Not needing the hot metal production from one of its eight blast furnaces to sustain its steel output, and in the interest of conserving iron ore, Inland held its Indiana Harbor, Ind., No. 2 stack idle when the strike ended. United States Steel, on the other hand, was suffering loss of iron from two furnaces at Gary, both down for repairs. One had been undergoing remodeling when the strike hit; the second couldn't be restored to operation after the strike because of condition of its lining. Consequently, the loan arrangement with Inland.

As of mid-December the operation continues. United States Steel supplies its own ore and other raw material ingredients. Inland crews man the furnace. Molten iron is transported from Indiana Harbor to Gary by railroad car type ladle. Iron output is in the neighborhood of 800 tons daily.

It is basic iron for steel making that is being produced. However, indirectly it is making more pig iron available for foundry use. U. S. Steel normally produces iron for sale and, through the assistance of the iron from the Inland furnace, company has been able to meet its usual commitments. Before long output of the furnace will be needed by Inland to support its enlarged steelmaking capacity.

GRAY iron foundrymen in this area are not overjoyed with their business prospects for the new year. For one thing, automakers are going to be driving hard bargains despite their anticipated higher rates of production. The buyer's market will be in full swing at every level of trade. Defense work, furthermore, is a shaky prop to foundry business and the stretch-out of military truck and tank schedules and possible cessation of production at some tank facilities late in the year indicates that less business can be expected from these quarters.

There are some potentially very significant "X" factors in their business equations, too. The development and rapidly growing use of plastic dies by automotive stamping plants is one of these. Another is the possibility of aluminum engine installations in passenger cars. This, at the moment, looks remote, but it is commanding real consideration by some of the most prominent members of the auto industry. Fears are also expressed that greater availability of aluminum will result in its use in preference to iron in some automotive applications.

To sceptics who might feel that the cry of "wolf" has already been raised too often on some of the above points, the following information from the superintendent of one of the Detroit area's largest captive gray iron foundries will be disconcerting. This man confides that plans were progressing to build a modern iron foundry to replace the one the organization is now running, but they decided to hold up until they could properly appraise the potential of aluminum for automobile engines. This company, incidentally, is currently doing intensive experimental work with several aluminum engine designs.

Favor Cast Iron Engine Block

On the other side of the coin, however, are the foundry expansion and modernization programs which indicate that the cast iron engine will enjoy many more years of acceptance. Ford, for example, is currently reequipping its Dearborn engine foundry to make it similar in mechanization to the new Cleveland facility. Dodge recently installed new ventilating equipment at shakeout, and high production sandslingers, and will add automatic multi-station coreblowing equipment. A unique departure from common block casting procedure, incidentally, is used at Dodge, where two V-8 blocks are cast in the same flask using a common sprue.

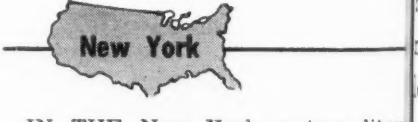
On the plastic die subject, one of Detroit's best known die shops is now making these for several customers, and each member of motordom's Big Three is in production on a limited scale of stampings with plastic dies. Several independent car makers and body stampers are also working with the nonmetallic material. A relevant bit of information is that at least one warehouse source of die blocks is interested in stocking the plastic resins for these dies.

Whether aluminum is in easier supply or not next year, there are going to be some changes in parts now cast in iron. Pontiac has put aluminum pistons in its new cars, and Chevrolet reportedly is abandoning iron pistons too in favor of aluminum. Buick is understood to be redesigning the Dynaflow transmission so that it can use a cast aluminum housing instead of iron. If the light metal is not plentiful, the division may not use plaster cast aluminum for the turbine or pump but may make these components from brazed steel stampings the way Chevrolet's Powerglide unit is fabricated.

As the New Year approached, many independent foundries were finding orders dropping off, and some which had recovered nicely from the summer's slump were reducing their work week again. Some of the decline stemmed from model changeovers in the auto industry and is regarded as temporary, however.

Shell molding remains such a new process that no one in the foundry industry is sure just what its future is. An enthusiastic government report on tremendous gains which may be made in resin production is taken with a grain of salt by some of the suppliers who have run into resistance, but they expect one of two things to happen with shell molding. It will have a steady upward growth as the process gains converts or it will explode by chain reaction. Whenever the process is the subject of a technical discussion in foundry circles it has attracted very high attendance—an indication of the interest. Most resin suppliers seem to lean to the view that its growth will be relatively slow, but sound

An interesting process has been developed for a shell-molded core used in a jet engine part. The core is made in one piece with no hole but is hollow for greater permeability. This is accomplished by measuring the amount of sand-resin mix fed into the core pattern so that only enough to coat the pattern is used. The pattern is then rotated so that centrifugal force voids the center of the core while it is being formed.



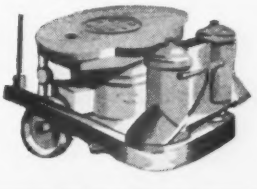
IN THE New York metropolitan area, operations at the gray iron shops have been lagging all fall and at the moment are being further adversely affected by holiday and year end influences. Even at the beginning of December some shops were doing little better than three days a week and few were operating more than four days. Malleable shops have been losing ground, although holding at higher operating levels than gray iron plants. Steel casting demand is not sufficient to sustain backlogs, but shops still are well booked ahead. Operations at brass shops throughout the greater part of the fall exceeded expectations.

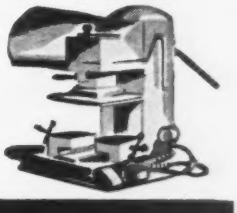
Triplact — a remarkable Additive to foundry sand

The Colossus of Rhodes, sixth wonder of the world, stood at the entrance of the harbor of Rhodes. It was made of brass, cast in enormous molds.

If not actually colossal, Triplact is at least an immense contributor to better results. Its triple action provides increased flowability, faster cleaning and fewer expansion defects.

As always, ECP offers you a product exhaustively tested and proven able to assure you of the results set forth herein. Triple-acting "Triplact" will help you produce better castings and more of them in less time and at a lower cost than ever before. Light weight and high efficiency make it truly economical. Ask for *all* the facts.





Triplact FOR MOLDING SAND

Let Triplact point the way to silkier sand, faster cleaning, improved finish due to higher flowability and denser molds, control of expansion and collapsability to eliminate scabs and buckles and veins, easy and rapid shake-out, and greater versatility.

Triplact FOR CORE SAND

You profit from similar advantages here. Expect *and get* smoother surface, harder cores with reduced veining, less burn-in, and more collapsability. Smoother, faster shake-out speeds production. Little or no grinding, chipping and poking.

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By EDWIN BREMER

Foundry DEVELOPMENTS

PRELIMINARY experimental work on a study of fundamental factors influencing chill and mottle formation in cast iron has been reported by W. J. Williams in the October, 1952 issue of the *Journal of Research and Development* (Birmingham, England). Some of the conclusions are:

(1) The effect of superheating is due mainly to the elimination of nuclei in the melt. (2) The late addition of graphite to the melt eliminates the carbide stabilizing effects produced by superheating within the temperature range studied. (3) The effects of superheating are not due entirely to changes that may take place in the amount or distribution of the oxygen present in the metal. (4) The graphite flakes present in the base material have a graphitizing potential that is retained throughout the subsequent melting procedure.

* * *

INDUSTRY in general is doing much talking about the "pushbutton" factory of the future, and continued progress in equipment development will permit that term to be applied to a large part of foundry operations. Incorporation of automatic features has been particularly noteworthy in molding machines. One of the latest designs is a cope and drag unit developed by SPO Inc., Cleveland, in which manpower requirements are limited to core setting. All other steps in making and closing the mold are performed mechanically in an automatic cycle. Possessing exceptionally high production capacity, the first unit has been in successful operation at a midwestern foundry for a number of months.

* * *

SOME sand technicians claim benefits from adding a wetting agent to mold wash. The wash is said to penetrate farther into the mold surface, resulting in a better peel of the sand in shaking out and an improved casting finish.

* * *

APPLICATION of cerium - lanthanum compounds in the production of basic steels for castings provides worthwhile improvement in a number of properties, according to Mickelson and Lillieqvist, as reported at the recent Electric Furnace Steel Conference. Since the material is an effective deoxidizer in itself, beneficial property improvements are secured only when it is added in the furnace after the steel has been deoxidized. Properties which are improved by cerium-lanthanum additions include impact—particularly at low temperatures—ductility, fluidity, feedability, inclusions, hot tears, porosity, solidification, weldability and sulphur reduction. No effect was observed on tensile and yield strengths, temper brittleness and hardenability.

* * *

INDICATIONS are that, before too long, precoated, resin-bonded sand will be on the market for producing shell molds. Precoating is accomplished with resins in liquid form, and it is intimated that less resin is employed than when dry material is employed. Segregation of resin also is said to be eliminated. In the works is a procedure whereby the consumer can precoat his own sand if he so desires. One thing that may hold the latter back for a time is the availability of suitable processing equipment.

* * *

OPERATIONS some times get out of control and back to normal for no apparent reason, but every now and then circumstances put the finger on the whys and wherefores so that second occurrence is prevented. Such was the case in a basic electric steel melting operation. Due to heavy rainstorms, the pebble lime used for slagmaking became damp, and considerable trouble was encountered with sluggish metal, ladle skulls, shaping up the slag, increase in P and S in the steel, and misrun castings. As soon as the damp material was used up, and a new supply of dry lime was employed, the troubles disappeared as if by magic. Consensus was that use of partially slaked material reduced the amount of effective lime for melting which had an adverse effect of P and S removal as well as the volume of slag. Decrease in amount of slag on the ladle permitted higher heat losses and reduction of metal temperature.

* * *

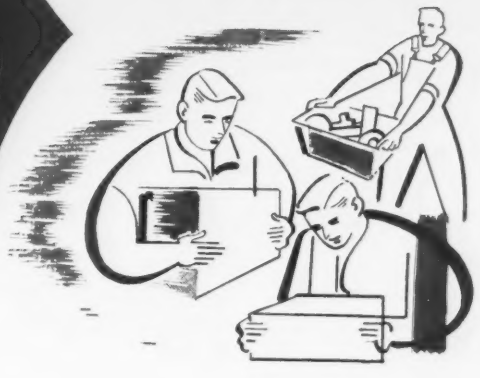
BRITISH firm manufacturing soldering equipment employing ultrasonic principles claims that it permits soldering of aluminum and other light metals and alloys without the use of fluxes. The device is said to be employed successfully in reclaiming light alloy castings that have surface defects such as blowholes, inclusions, etc. A tin-zinc solder possessing texture and color similar to those of aluminum is used. The device also may be found useful to modify or repair aluminum patterns. Ultrasonic soldering equipment consists of a soldering iron and a power unit. Soldering bit is heated by low voltage resistance winding, with power from a transformer in the power unit. The bit is attached to a magneto-striction transducer which causes its tip to vibrate at high frequency with an amplitude of less than one-thousandth of an inch. The vibration removes oxide films and permits rapid and effective tinning by the solder.

* * *

CONCLUSIONS of Jones and Bartlett in a study of "Viscosity of Aluminum and Binary Aluminum Alloys", Nov. 1952 *Journal* of the Institute of Metals (London), are Al and some of its binary alloys exhibit characteristic change point in their viscosity/temperature curves in the region of 760-770°C apparently due to some change of state in liquid metal. In binary alloys temperature where change occurs is not constant; varying slightly in accordance with the equilibrium diagram—maximum at limit of solid solubility and minimum at eutectic. Above this temperature viscosity is almost constant. Near the liquidus a second change point occurs with slopes altering over a range of temperature until it is almost vertical. Rate of slope change depends on alloying element; most rapid with eutectic alloys and pure Al.

Modern foundry cleaning and grinding room served by Logan Roller Conveyor. Castings in tote pans are conveyed to and from grinders. Lines in center are used for inspection. Transfers to spur lines are facilitated by Disappearing Roll Sections.

MINIMIZE MANUAL MOVEMENT!



How many times do you "pick it up—and lay it down?" That is what costs money as your product moves through pouring, cooling, shake-out, grinding, packing and shipping.

Reduce the number of times the product is touched by human hands and you cut your costs . . . permanently.

Let Logan equipment do your moving. Frequently work can be performed enroute, without removal from the conveyor, and always there is a reduction in expensive manual handling.

And "don't forget the extras you get" in Logan engineering and design. Write today for literature.

Logan Conveyors

LOGAN CO., 580 CABEL ST., LOUISVILLE, KY.

S. J. Ruddock's office has soft yellow walls, burgundy door and a white ceiling for roominess

Twin offices of J. M. Price and E. M. Knapp have driftwood and chartreuse walls, white ceilings, burgundy doors and baseboards

M. F. Degley and his staff work in restful room done in driftwood and trimmed in soft yellow

COLOR Can Help To Improve OFFICE EFFICIENCY

Ferro Machine & Foundry Inc., Cleveland, operates a completely modern foundry even to the point of a $300,000 ventilating system. Yet, like a good many of its counterparts in industry, Ferro for many years conducted its business from offices that were as colorless as the foundry.

Now, however, its offices have been "color-engineered," and the results are reflected clearly in the increased efficiency of the busy office force.

Ferro's office building on the edge of Cleveland's heavy-industry valley adjoins the foundry. It is a rather handsome building erected in 1912. For 32 years the decorative scheme was dark varnished woodwork and buff walls that "wouldn't show the dirt." Offices were separated from each other by frosted plate glass partitions. The general effect made everybody feel like St. Paul "seeing darkly as through a glass."

About 1944 buff began to give way to green in popular esteem. Ferro followed the lead and had the offices redone in a monochromatic color scheme based on dark green. This change was an improvement but it still did not make the offices a cheerful, light-flooded place in which to work.

About this time S. J. Ruddock, Ferro's chief purchasing agent, became involved in redecorating his own home. The decorator suggested that a certain small room be finished in the then revolutionary style of gay wallpaper on two walls and light paint on the other two. This, he explained, would make the room seem larger and airier.

Mr. Ruddock, with tongue in cheek, subscribed to the idea. When the room was finished, his doubt changed to enthusiasm. In fact, he became so enthusiastic that he decided to see if the same approach couldn't do something for the Ferro offices.

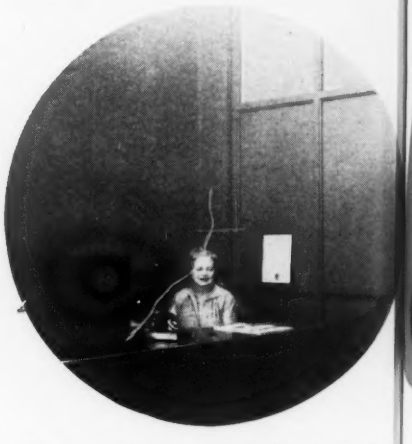
"I looked at it this way," he explains. "All of us spend at least eight hours a day in the office, which is certainly as much waking time as we put in at home. Why shouldn't the office be as comfortably decorated as our homes?"

E. M. Knapp, president of Ferro, thought Mr. Ruddock had a point. He agreed that the next time the offices were to be redecorated something would be done. That didn't happen until the spring of 1952. But when painting came up for discussion at that time, Mr. Ruddock repeated his ideas, and Mr. Knapp backed him up.

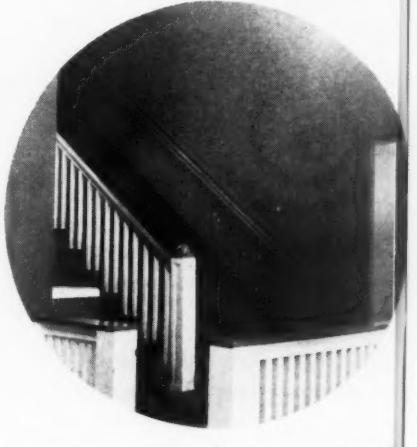
J. K. Chadwick of the Boyd E. Hart Co., a local painting contractor, was called in. He and Mr. Ruddock, together with Maurice F. Degley, chief engineer, discussed the idea with Harry H. Scheid, a color consultant for the Sherwin-Williams Co.

They told Mr. Scheid to work out a color scheme that would give the offices a pleasant, attractive air. He

(*Concluded on page* 146)



The paneled wall behind Violet Lease is companion red; wall on right is expanse of hedge green



Stairway is cool green, newel post and balustrade are white, and the handrail is hedge green

SIMPLICITY

model V-S conveyors help speed production and cut costs of handling hot foundry sand

At a foundry producing a variety of malleable iron castings, this 36" x 30' Simplicity Model V-S Conveyor moves hot sand from two shakeouts up a 3° incline to an elevator at an average rate of 80 tons with a peak load of 120 tons per hour. As the sand moves along the conveyor, water is added and plows turn the sand thus reducing the sand temperature 100°. The sand is discharged into the elevator boot over a permanent magnet that removes all metal particles.

Simplicity Conveyors and Os-A-Veyors greatly simplify the movement of sand and castings and hot abrasive materials in foundries. They can be installed to carry most any type or quantity of material you need. Simplicity Conveyors and Os-A-Veyors are easy and inexpensive to operate, maintain and repair.

112

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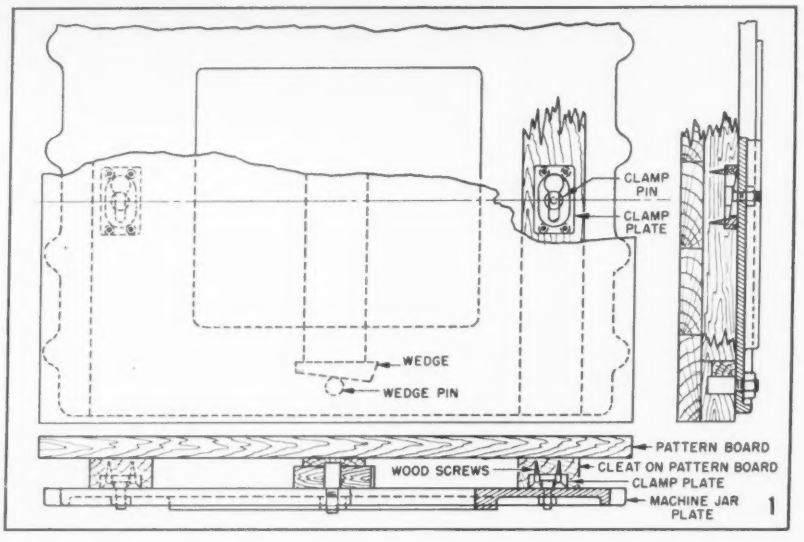
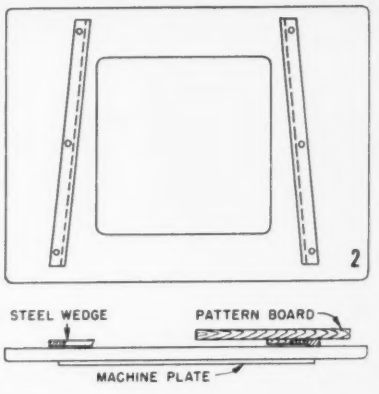
How To Do It . . .





By L. D. PRIDMORE, president, International Molding Machine Co., La Grange Park, Ill.
as told to
ROBERT H. HERRMANN, assoc. editor, *FOUNDRY*

Quick Machine Mounting Devices For Wooden Pattern Boards

HERE ARE a couple of timesaving arrangements for mounting wooden pattern boards on rollover molding machines. They are particularly adaptable to short-run jobs incorporating several pattern changes on one machine during the course of a day's operation. Fig. 1 shows a slotted metal clamping plate mounted in two wooden battens located near the sides on the bottom of a pattern board. Inside of the slotted face is tapered toward the back of the plate. The slots fit over pins in the machine jar plate, holding the pattern board tightly against the jar plate by the wedging action of the tapered clamp plate against the clamp pin.

To keep the pattern board from working loose from the clamp pins, a third pin is mounted in the jar plate at the end of the pattern board and a wooden wedge driven between it and a third batten fastened on the bottom of the pattern board along its center line and parallel with the other battens.

Remove the wedge, tap the opposite end of the pattern board slightly to loosen it from the clamp pins, and the board can be removed. Another pattern board can be wedged against the pins and the machine is ready to go on another job.

Another wedging arrangement for holding pattern boards on molding machines is shown in Fig. 2. Two metal strips are mounted on the molding machine plate at a converging angle. These strips are undercut to secure a firm grip on similarly undercut wood strips mounted at the same converging angle on the bottom of a pattern board. Merely slide the board against the wedging strips on the machine plate and the job is ready to run. A locking pin and wedge arrangement, such as described above, also may be used here to prevent the pattern board from working loose.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $10 for each idea submitted and published. Send a photo or drawing with your idea

(*Concluded from page* 144)

developed a plan which makes each office different from the one next door, yet keeps an overall color harmony. His color recommendations were shown to office personnel concerned, and if they expressed any strong likes or dislikes, their opinions were taken into consideration.

"It really is surprising how many of our people were convinced that color-engineering the offices wouldn't work," Mr. Ruddock recalls. "Accustomed to the somewhat colorless surroundings which most of us had come to accept as part of working in a foundry office, more than a few of our office employees doubted the wisdom of the plan. But now that we have brought such gay colors as soft yellow, marine blue, companion red, driftwood and chartreuse into the office, the opinions are unanimously the other way."

Visitors often ask Mr. Ruddock how Ferro manages to keep the light colors clean. "Very easily," he replies. "We wash the walls periodically. We had to do that when the walls were buff, too. The difference is that now we do wash them instead of telling ourselves the dirt doesn't show!"

Results of the decorating revolution are stimulating not only to the eye but also to efficiency, according to Mr. Ruddock. "We don't walk around with wide grins on our faces," he says, "but you can sense the cheerful attitude that prevails.

"Equally important is the dispatch with which our paper work is done. Efficiency is up considerably—a gain which our customers and suppliers are as happy about as we are."

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MAN-TO-MAN

on the Molder's Bench

"The Howdy Rounds"

By RALPH L. LEE

MAYBE I have a streak of the old show-off in me, but it seems that when I do a job that turns out pretty good, I just have to show it to somebody. When I visited John Linabury some while back, he showed me a small brass ash tray he and his lady had brought back with them from a visit to England. It looked to me as though it had been hot forged or maybe coined. At any rate, it had beautiful detail in it; in fact, it looked as though it might have been hand engraved, maybe under a magnifying glass.

I wondered out loud just how much of that detail I might pick up with my Albany molding sand and my new molding machine in the Lee Hobby Foundry. John told me to take the ash tray along with me and give it a whirl. So I did. I got the sand heap in super-duper shape, made two molds with the best molding I knew how to do and poured them with metal at exactly the right temperature.

When I shook them out, I was tickled pink. I wouldn't have believed that in green sand I could get the detail those castings showed. In spite of the fact that both castings had cold shuts (they were very, very thin in spots), I didn't even wait for one to cool off. I grabbed it with the tongs and went racing down the hill to show it to Mother (that's Mrs. Lee, my home superintendent, vice president in charge.)

She ohed and ahed, and I know she meant it. In fact, she didn't even see the cold shuts. But I showed them to her and explained how I was going to get rid of them on the next try by filling in the thin spots with wax and making the gates a little wider, as I did.

I got good ones the next time (well, practically, that is—two out of three); and again I went racing down the hill to show Mother the best one; and again I told her what the next step was to be. (You know, that gal is getting the hang of this foundry business—she's beginning to talk the lingo!)

I am now putting wax behind the border to serve as a channel to feed all parts of the casting so that getting good ones won't involve the tightrope balancing of metal temperature, sand moisture, mold hardness, gating and risering that it has so far. I know pretty well what is going to happen on the next stab. I'm going to get good ones, one for one. And I know another thing that's going to happen: I'll race down the hill again with a sample in my tongs to show Mother.

While I'll admit again as I did in the beginning of this article that there definitely is a streak of show-off in me, I don't feel too much of a freak, for I've noticed that there is a certain amount of show-off in all of us. Maybe we had better say that none of us can do a good job and keep on doing it without having some attention paid us or getting some sort of credit besides cold cash.

There isn't the slightest doubt in my mind that failure to recognize that it is beyond the power of any individual to do anywhere near his best if no one sees what he is doing, or says anything about it, lies at the very bottom of most of our sick organizations and labor squabbles.

We wouldn't have to look very closely or very far to find thousands of people who know their jobs and do them day in and day out without so much as a hi, yes or no from their bosses, except when something goes haywire or something extra is asked for. None of us would think of rigging up a job, setting it up, checking up the first casting and then turning it loose to run on its own until there's heck to pay from the customers. Yet we'll have to admit that far too frequently that is exactly what happens to the individual who does what has to be done to make the castings.

There are reasons for this state of affairs, of course. Bosses have too much to do putting out fires, getting bugs out of the processes and patterns, getting materials and tools, smoothing down the feathers of cantankerous customers and getting all fouled up through their inability to manage themselves.

Then there's another reason which well may be the most important of the lot—the mistaken notion that the pay check discharges the obligation of the employer to the employee and vice versa.

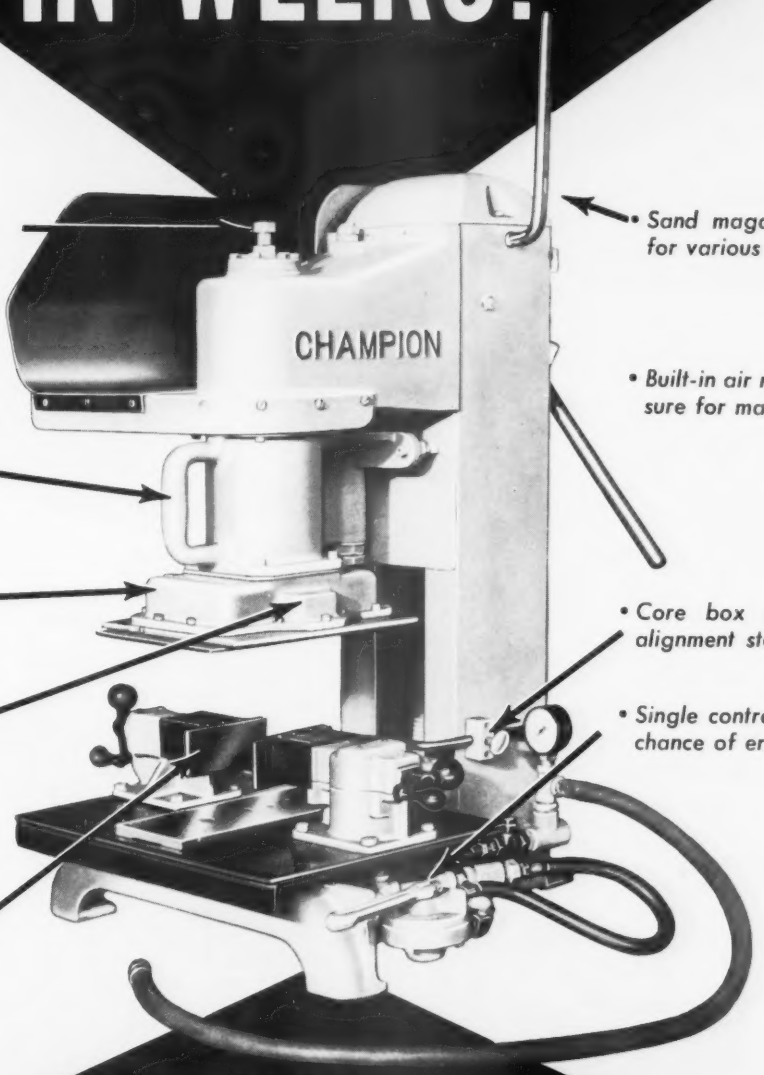
If the fairy godfather of all foundrymen were to suddenly appear before me and offer to grant me one wish by the waving of his golden skimmer, I wouldn't hesitate a second to name mine. It would be this:

Every manager or owner, every work day morning of his life, before he even looked at his mail or what was on his desk, would stick his head through the doors of the individuals who report directly to him and say "Howdy," with nothing else on his mind but "How are you personally?" Not "How is the job coming?" or "When can we have them?" "Where are they?" or "Why didn't you?"

Then each of these folks who had been duly howdied would do exactly the same thing to the individuals who report directly to him. This process would go on until it would be impossible for anyone in the place, from the lowliest sweeper

(*Concluded on page* 151)

PAYS FOR ITSELF IN WEEKS!



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CHAMPION CB-5 CORE BLOWER

- *Handles jobbing or production work up to 4½ lbs.*

LOWEST COST complete unit on the market!

No extras to buy—complete with air gauge, blow gun, master blow plate, two blank blow plates, vertical clamp and vent plate for blowing vertically-split cores, and Magna-Hold quick-change blow plate holder.

Send this postcard for complete information! →

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LOOK TO BEARDSLEY & PIPER FOR BETTER METHODS

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☐ Please send more information on the Champion CB-5 Core Blower.

☐ Have sales enginer call.

☐ Please send more information on the Speedmullor-Preparator Unit (shown on next page).

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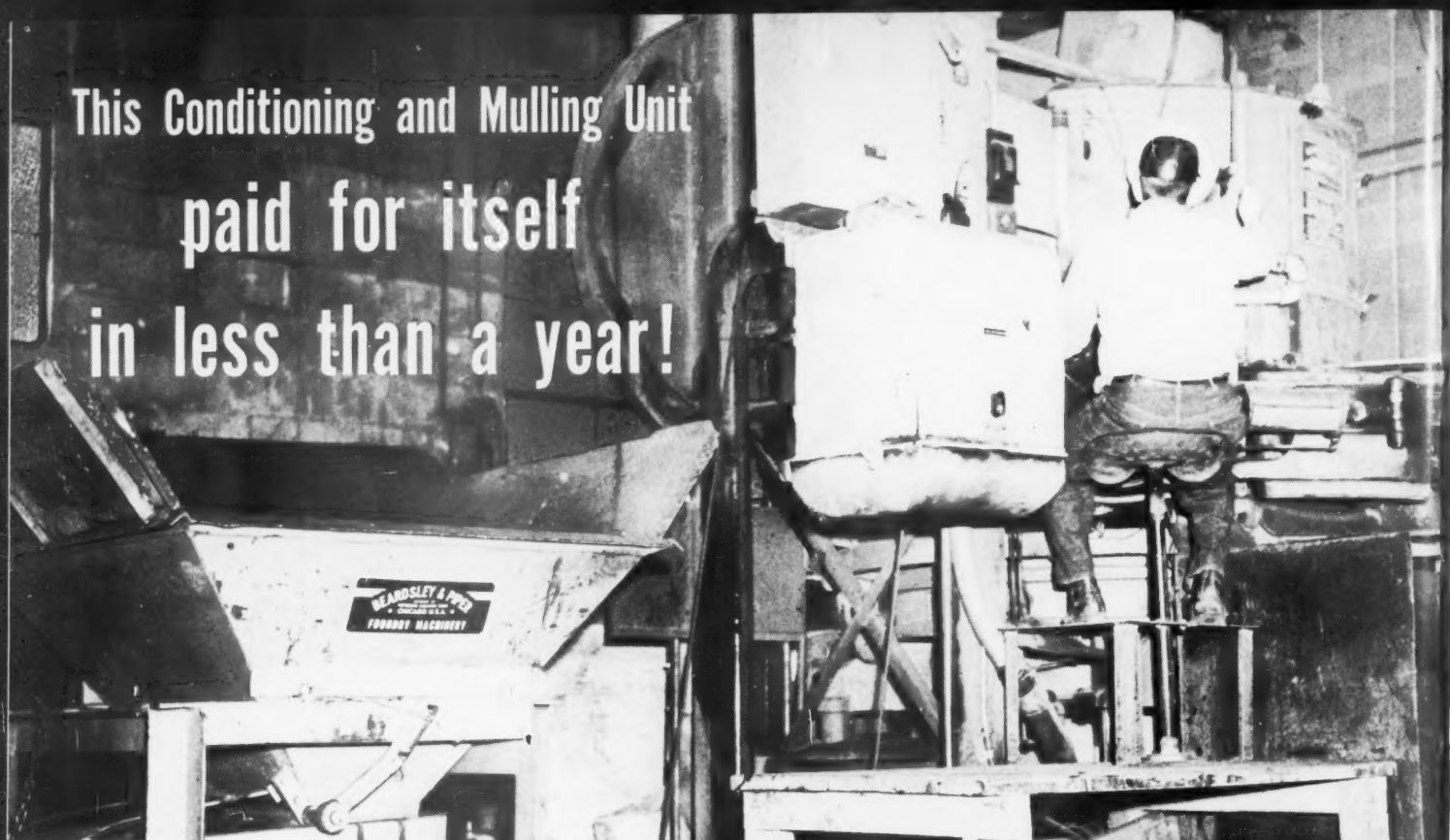
This Conditioning and Mulling Unit paid for itself in less than a year!



. . . and provided **MIDWEST FOUNDRY*** with these advantages!

1. *Completely mulled and thoroughly conditioned molding sand*
2. *Reduction in night crew from 22 to 14 men*
3. *Use of a single all-purpose molding sand with virtual elimination of facing*
4. *Increased production*
5. *20% material saving*
6. *40% reduction in moisture content with improved sand properties*
7. *Green strength increase of from 9 to 12 p.s.i.*
8. *Flowability increase of 30%*
9. *Improved surface finish and casting quality*
10. *20% reduction in the scrap rate*

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B&P Combination Units are built in sizes offering capacities of 7 to 70 tons of mulled and conditioned molding sand per hour. There is a size for your foundry!

Send this postcard for complete information!

(*Concluded from page* 148)

clear through to the man at the top to get very far into his work without having the person who tells him what to do, greet him as a fellow human being.

I am sure that if my wish were granted, we all know what would happen. Many silly gripes which grow into movements would be nipped in the bud, wrongs would be admitted and corrected, and rights would be acknowledged and defended. But I believe the greatest benefits of all would show up in an increase in both quality and quantity of production, which folks who know they are recognized as individuals invariably turn out.

While I'm afraid that my wish is something on the order of a dream, I know that the payoff on regular, come rain or shine howdy rounds is not a dream. It works and is now working in any number of topnotch foundries and factories all over the country. *It is beyond the power of human flesh to tolerate being ignored for long. Even a kick in the pants is preferable.*

There's a movement on foot for about everything else under the sun. Why not start a "Howdy Round" movement in the foundry industry? We wouldn't need any national organization, dues, meetings, contributions, presidents or conventions. The time required wouldn't be enough to shake a stick at, and after all it wouldn't hurt to see if everybody is on the job.

Tentative Program for Paris Congress Drawn

The Association Technique de Fonderie has drawn up a provisional program for the week of the International Foundry Congress in Paris from Sept. 19 to Sept. 26, 1953. A summary follows:

Saturday, Sept. 19—Registration of delegates and visitors. From 6 to 8 p.m., members attending the congress are invited to a reception by the committee of the French Association.

Sunday, Sept. 20—Excursion around Paris and a luncheon.

Monday, Sept. 21—Formal opening of the congress in the morning, official reception in the afternoon, and dinner followed by entertainment in the evening. Technical sessions will be held during the day.

Tuesday, Sept. 22—Technical sessions will be devoted to foundry training and education, with lectures and films.

Wednesday, Sept. 23—The morning will be devoted to technical sessions, the afternoon to works visits. In the afternoon, meetings of the International Committees of foundry technical associations will take place. A dinner for members of the international committee will be held in the evening.

Thursday, Sept. 24 — Technical sessions throughout the day and a visit to the Louvre Museum in the evening.

Friday, Sept. 25—The day will include technical sessions in the morning and a visit to the laboratories of the Centre Technique des Industries de la Fonderie at Sevres, including a reception by the Centre, in the afternoon.

Saturday, Sept. 26—Technical sessions will be offered during the morning, the congress will be formally closed that afternoon, and a banquet and dance will take place in the evening.

A special program will be arranged for the ladies.

Revision Adds 345 Titles to Industrial Film List

A comprehensive listing of industrial training and education films, "Industrial Film Bibliography," has been published in a third edition by the National Metal Trades Association. A thorough revision of the second, 1949 edition, the current work contains 345 new titles.

The volume lists, classifies and describes films on 1390 subjects in its 100 pages, indexed by both subject matter and title. Each listing shows size of film, running time, cost, source and a paragraph of descriptive matter.

Copies are being distributed to the 1200 company members of the NMTA, and others may order the volume from association headquarters at 122 South Michigan Ave., Chicago 3.

BETTER CASTINGS!
For good, sound castings free from pinholes, and shrinkage cracks, keep close control of your molten metal temperatures! Check the temperature of every melt frequently with Marshall Enclosed-Tip Thermocouples.
Use of Marshall Thermocouples will enable you to pour all melts at definite, correct temperature. Underheating and overheating of metals, and misruns and cold shuts, are prevented. Castings also have better finish, require less cleaning.
Use Marshall thermocouples for checking all your nonferrous molten metals — brass, copper, aluminum and magnesium. L. H. Marshall Co., 270 W. Lane Ave., Columbus, Ohio.
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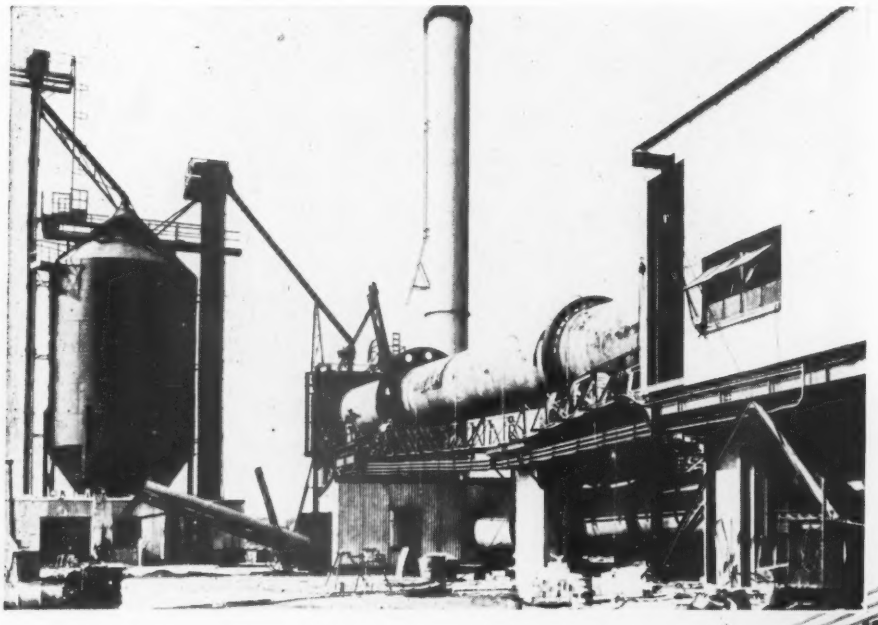
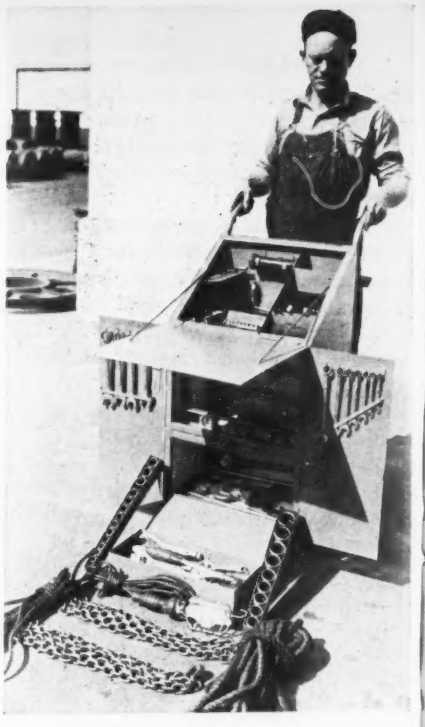
NEWS VIEWS

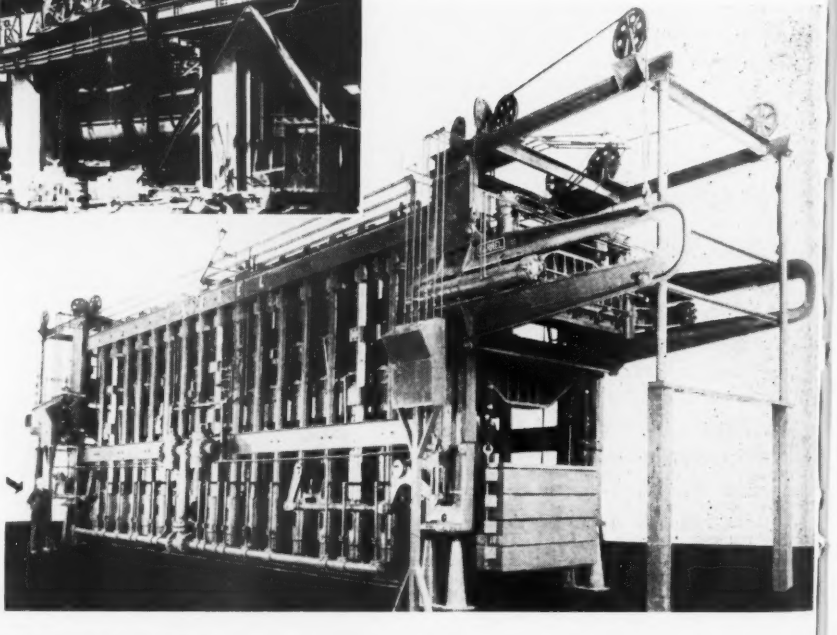
ROTARY CALCINER: This rotary calciner (below) has been installed at the Niagara Falls, N. Y., plant of International Graphite & Electrode Division, Speer Carbon Co., for the purpose of calcining coke to be used in the manufacture of graphitized carbon electrodes and specialties. The large cylindrical tank (left) is the green coke storage bin. The stack (center) carries off smoke and gases from the calcining process as coke moves through the calciner. The cylinder at ground level carries the calcined coke back beneath the calciner to the loading area, where it is delivered to hoppers and cars by a portable conveyor.





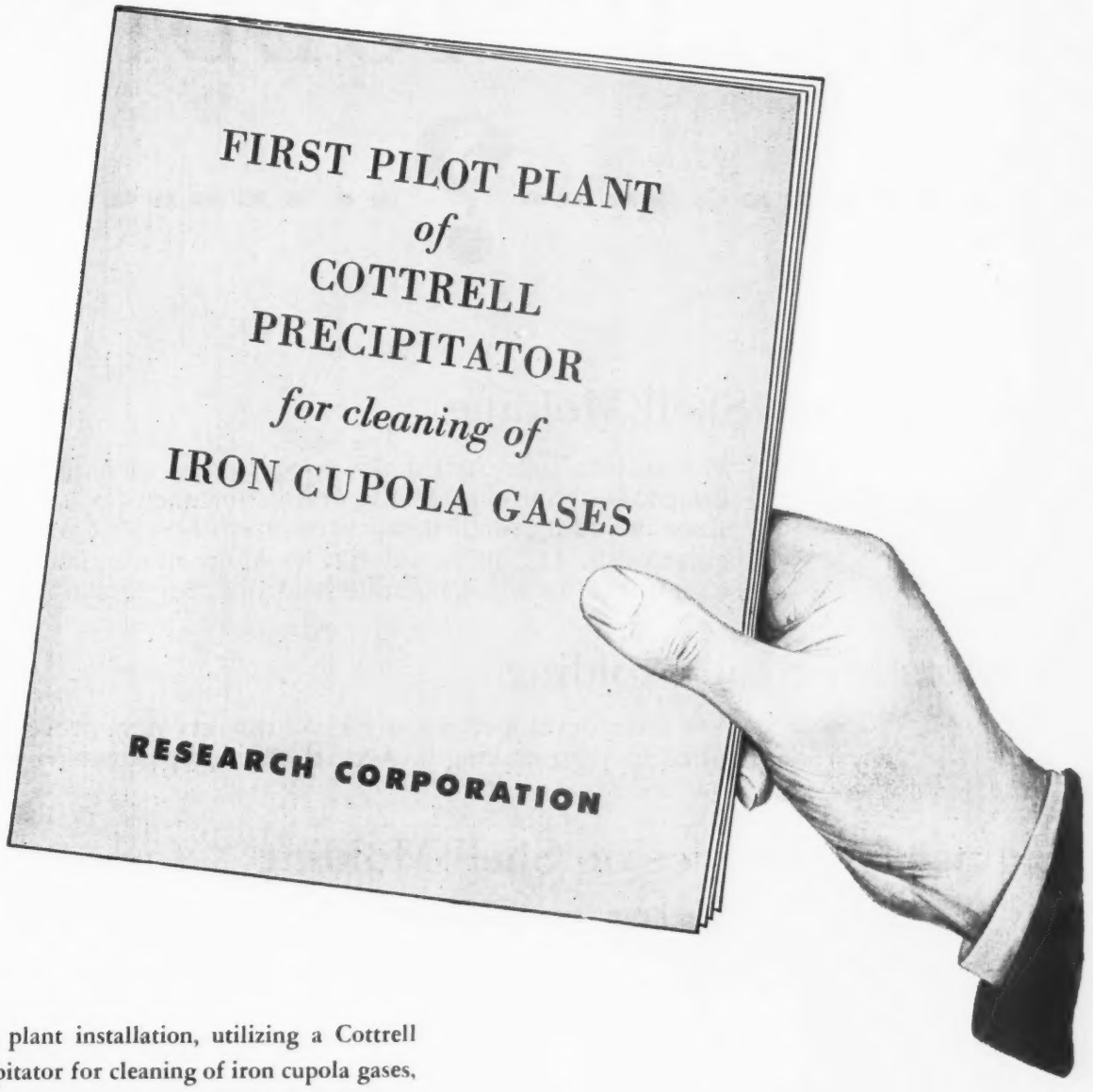
MOBILE TOOL BOX (above): National Supply Co., Torrance, Calif., is no place for a maintenance man to go out on a job without the right tools. So A. J. Baker designed and built this portable tool box to contain everything he might need. Two wheels and convenient handles make it easy to push. It stands firmly at rest.

CONVEYOR BELT PRESS (right): Plant buildings had to be revised for the installation of this conveyor belt press at Goodyear Tire & Rubber Co., Akron, O. Said to be the largest in the world, it is 41 ft long, over 80 in. wide and capable of vulcanizing conveyor belts up to 72 in. wide. Farrel-Birmingham Co., Ansonia, Conn., designed and built it aided by Goodyear engineers.



PLANT OPENS (left): Airco Equipment Mfg. Division of Air Reduction Co., New York, officially opened its Union, N. J., plant recently. Employing about 1000 persons, the new facility produces over 12,000 different items, including welding and cutting torches, tips, regulators and oxygen and acetylene manufacturing and distributing equipment. Shown here is the flame test department, where welding and cutting tips are tested before shipping.

News on a New Process



The first pilot plant installation, utilizing a Cottrell Electrical Precipitator for cleaning of iron cupola gases, had resulted in detailed findings of industry-wide importance. On the basis of facts unearthed about cupola operation and the study of the design factors involved in this project, foundries have already placed orders for 15 precipitators with Research Corporation.

Ask your Research Corporation representative to go over the findings of this first pilot plant installation with you. His recommendation on your specific problem is based on 39 years of experience in the design and erection of over a thousand Cottrell Electrical Precipitators.

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We have developed a truly revolutionary new process (patents applied for) for making low-cost shell mold patterns *from your present pattern equipment.*

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We have been designers and builders of machine tools and special machinery for the past 25 years. Our experience and "know-how" on shell molding is, we think, rather broad. We have an established research, development and test laboratory for studying shell mold problems and processes. *We invite your questions.*

Bulletin "F"—If you will send us your particular questions, we will be glad to discuss them for you and will be happy to send you a special Letter-bulletin "F" which deals with the services described above.

Watch For Our 2 Head "30 x 40" Pattern Plate Shell Molding Machine in the February Issue.

WINTER ENGINEERING COMPANY & SHELLCAST CORP.

1200 NIAGARA, BUFFALO 13, N. Y.

STANDARD SPECIFICATIONS FOR BRONZE CASTINGS FOR BRIDGES AND TURNTABLES

ASTM Designation: B 22—52

Adopted, 1949, Revised, 1951, 1952.

Scope

1. (*a*) This specification covers five alloys of bronze castings for turntables, movable bridges and bridge parts, and two alloys of cast-bronze plates used in bridges and other structures for fixed and expansion bearings where motion is slow and intermittent.

(*b*) The purposes for which these classes are ordinarily used are as follows:

Alloy A.—For contact with hardened steel disks at low speeds under pressures not over 3000 psi., for example, disk-bearing metals used in center-bearing swing bridges.

Alloy B.—For contact with hardened steel disks at low speeds under pressures not over 2500 psi., for example, disk-bearing metals used in turntable and center-bearing swing bridges; for contact with steel (tensile strength 60,000 psi., min.) at low speeds under pressures not over 1500 psi., for example, trunnions of movable bridges; and for bearings and expansion plates under pressures not to exceed 2500 psi.

Alloy C.—For ordinary machinery bearings, and for bearing and expansion plates under pressures not to exceed 1000 psi.

Alloy D.—For gears, worm wheels, nuts, and similar parts which are subjected to other than compressive stresses.

Alloy E.—For bushings for bridge pins and similar applications where angular movement is slight and compressive stresses may attain 8000 psi.

Manufacture

2. (*a*) Each of the alloys called for in this specification shall be made from materials such that the finished product will conform to the requirements for the specified class.

NOTE.—Materials conforming to the following specifications are satisfactory for use in the manufacture of bronze castings described in these specifications:

Material	A.S.T.M. Designation[a]
Copper	B 4, B 5, B 115, or B 216
Phosphor Copper	B 52
Tin	Equal to "Banca" or "Straits"
Zinc	B 6
Ingot (for class C)	B 30, Alloy 3A
Ingot (for class D)	B 30, Alloy 1A

Clean new scrap of known composition, produced at the foundry at which the bronze is cast, may also be used.

[a] These designations refer to the following specifications:
Standard Specifications for Lake Copper Wire Bars, Cakes, Slabs, Billets, Ingots, and Ingot Bars (A.S.T.M. Designation: B 4),
Standard Specifications for Electrolytic Copper Wire Bars, Cakes, Slabs, Billets, Ingots, and Ingot Bars (A.S.T.M. Designation: B 5),
Standard Specifications for Electrolytic Cathode Copper (A.S.T.M. Designation: B 115),
Standard Specifications for Fire-Refined Copper for Wrought Products and Alloys (A.S.T.M. Designation: B 216),
Standard Specifications for Phosphor Copper (A.S.T.M. Designation: B 52),
Standard Specifications for Slab Zinc (Spelter) (A.S.T.M. Designation: B 6), and
Standard Specifications for Copper-Base Alloys in Ingot Form for Sand Castings (A.S.T.M. Designation: B 30).

Table I—Chemical Requirements

Properties Considered	Alloy A	Alloy B	Alloy C	Alloy D	Alloy E
COMPRESSION					
Deformation limit, min., psi	24,000	18,000	.....	.....	55,000
Permanent set in 1 in. under 100,000 psi., in.	0.04 to 0.12	0.10 to 0.20	.....	.....	0.03 max
Maximum compression under 10,000 psi., in.	.....	.....	0.001	.....	.....
TENSION					
Tensile strength, min., psi	.....	.....	.....	40,000	110,000
Yield strength min., psi	.....	.....	.....	18,000	60,000
Elongation in 2 in., min., per cent	.....	.....	.....	20	12
Brinell hardness number	.....	.....	.....	.....	223 min.

(*b*) The preferred method of compounding alloys A and B is the use of new metal (Note).

(*c*) Care shall be exercised that the metal is not overheated and that the temperature at pouring and the conditions of cooling are such as will be most likely to secure dense castings.

Chemical Composition

3. The bronze shall conform to the requirements as to chemical composition prescribed in Table I.[1]

Chemical Analysis

4. (*a*) An analysis of each melt may be made at the option of the purchaser. The chemical composition thus determined shall be reported to the

Table II—Physical Requirements

	Alloy A		Alloy B		Alloy C		Alloy D		Alloy E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Copper, per cent	79.0	82.0	82.0	85.0	78.0	82.0	86.0	89.0	60.0	68.0
Tin, per cent	18.0	20.0	15.0	17.0	9.0	11.0	9.0	11.0	...	0.20
Lead, per cent	...	0.25	...	0.25	8.0	11.0	...	0.30	...	0.20
Zinc, per cent	...	0.25	...	0.25	...	0.75	1.0	3.0	remainder	
Nickel, per cent	...	...	...	...	...	1.0	...	1.0	...	...
Iron, per cent	...	0.25	...	0.25	...	0.15	...	0.15	2.0	4.0
Antimony, per cent	...	...	...	...	...	0.75	...	...	...	...
Phosphorus, per cent	...	1.0	...	1.0	0.10	...	...	0.05	...	...
Aluminum, per cent	...	...	...	...	...	...	...	...	3.0	7.5
Manganese, per cent	...	...	...	...	...	...	...	...	2.5	5.0
Copper plus tin plus lead plus nickel, per cent	...	...	...	...	98.50	...	...	...	...	...

Note.—Analysis shall regularly be made only for the elements designated in **boldface type.** However the presence of the other named elements outside of the limits specified in this table shall constitute cause for rejection of the castings.

[1] Material with a range of composition differing from that prescribed in Table I, or containing elements not specified, may be used, provided the manufacturer shall submit in writing previous to the execution of the contract the range of composition of the material he proposes to use, and provided this range of composition shall be accepted by the purchaser.

STANDARD SPECIFICATIONS FOR BRONZE CASTINGS FOR BRIDGES AND TURNTABLES

ASTM Designation: B 22—52

Adopted, 1949, Revised, 1951, 1952.

purchaser or his representative and shall conform to the requirements, specified in Section 3.

(*b*) The compression test coupon shall be used for analysis.

Methods of Chemical Analysis

5. Analysis shall be made in accordance with the Standard Methods for Chemical Analysis of Special Brasses and Bronzes (A.S.T.M. Designation: E 54).

Physical Properties

6. (*a*) The bronze shall conform to the requirements as to compressive and tensile properties prescribed in Table II.

(*b*) The deformation limit in compression shall be determined as that load which produces a permanent set of 0.001-in. in the compression test specimen described in Section 8 (c).[2]

(*c*) Except for alloy E[3], the yield strength in tension shall be determined as the stress producing an elongation under load of 0.5 per cent, that is 0.01-in. in a gage length of 2 in.

Hardness

7. The hardness of the finished castings shall be tested by the brinell ball method and a record of the test furnished. The ball shall be of hardened steel 10 mm in diameter. Except for alloy E for which the load shall be 3000 kg, the load shall be 500 kg and shall be applied for 30 seconds to a finished plane surface.

Test Specimens

8. (*a*) It is recommended that the test specimens and coupons for tension tests be prepared in accordance with the provisions of the Tentative Recommended Practice for Tension Test Specimens for Copper-Base Alloy Castings (ASTM Designation: B 208), except that Fig. 1 of B 208 shall be used for alloy E and is not applicable to the other alloys.

(*b*) A suitable test bar for the compression test specimen shall be an integral part of the casting and shall be fed and cooled under the same conditions as the castings.

(*c*) Compression test specimens shall be cylinders 1 sq in. in cross-sectional area and 1 in. in height.[2]

Number of Tests

9. (*a*) One compression test shall be made from each melt for alloy A, B, and C castings; and one tension test from each melt for alloy D castings. For alloy E castings, one tension and one compression test shall be made for each four castings from the same melt and the same pattern. For castings of any grade weighing over 100 lb finished, the specified tests shall be made for each casting.

(*b*) Not less than two hardness tests shall be made for each melt.

(*c*) If any test specimen shows defective machining or develops flaws, it may be discarded; in which case the manufacturer and the purchaser or his representative shall agree on the selection of another specimen in its stead.

Significance of Numerical Limits

10. For the purpose of determining compliance with the specified limits for requirements of the properties listed in the following table, an observed value, or a calculated value shall be rounded off as indicated in accordance with the rounding-off method of the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E 29).

Property	Rounded-off unit for observed or calculated value
Chemical composition	Nearest unit in the last right-hand place of figures
Permanent set	
Maximum Compression	
Tensile strength	Nearest 1000 psi
Yield strength	
Deformation limit	
Elongation: 5 per cent and over	Nearest 1 per cent

Finish

11. The castings shall be sound, clean, and free from blowholes, porous places, cracks, and other defects.

Inspection

12. (*a*) Inspection may be made at the manufacturer's works where the castings are made, or at the point at which they are received, at the option of the purchaser.

(*b*) If the purchaser elects to have inspection made at the manufacturer's works, the inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector, without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

Rejection

13. Castings that show injurious defects revealed by machining operations subsequent to acceptance may be rejected and, if rejected, the foundry shall be notified within 30 days. The full weight of the original material rejected shall be returned to the manufacturer. The foundry shall not be responsible for the costs of machining defective castings.

[2] The matters of revising the dimensions of compression test specimens and the method of determining the so-called "deformation limit" are under consideration by Committee E-1 on Methods of Testing. Tests are being made on cylindrical specimens 1 sq. in. in cross-sectional area and 3 in. in height. Committee B-5 on Copper and Copper Alloys, Cast and Wrought, which has written this specification feels that this specification with the present compression tests as specified may be satisfactorily used until better compression test specimens are available.—ED.

[3] Until such time as Committee B-5 shall have more information, the yield strength for alloy E shall be determined as the stress producing a permanent set of the material of 0.2 per cent as determined by the offset method.

Additional copies of this specification may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., for a nominal sum.

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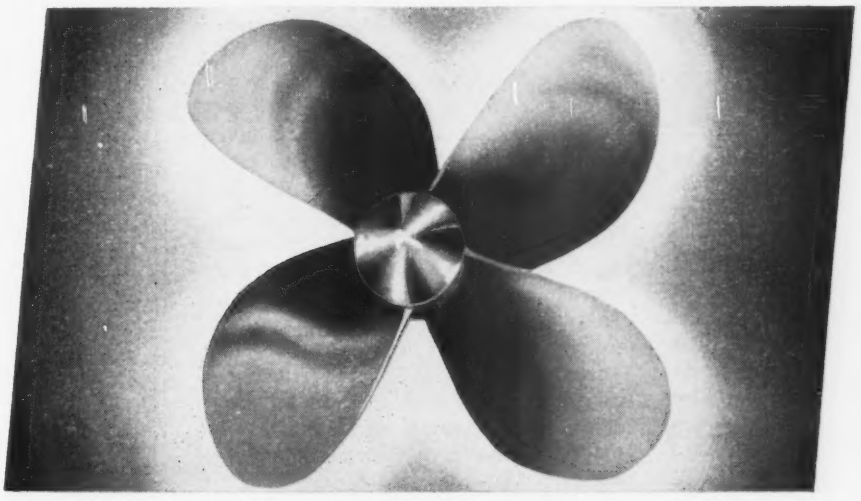

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Effect of Raw Materials on CUPOLA OPERATION

By BERNARD P. MULCAHY
President
Fuel Research Laboratory Inc.
Indianapolis

Effect on melt quality of equipment employed and manner of charging raw materials into the cupola is discussed in this eighth and concluding article of a series

PREVIOUS sections of this series of articles have discussed in some detail the principal factors involved in use of cupola raw materials, and have emphasized particularly the degraded characteristics which occur in greater amounts during times of unprecedented demands. In each instance, where it has been possible, modes of correction have been suggested.

It is quite obvious, of course, that although the materials themselves exert the greatest influence on the process, it is also evident that the equipment employed and the manner of charging the materials must also have an effect. These factors are now briefly reviewed.

Weighing—It long has been recognized that the only certain manner of controlling the chemical composition of the iron is to weigh carefully all of the components of the mix. Yet this step in far too many instances is carelessly performed. If this factor is important when materials are of normal quality, how much more so it becomes when all of the materials are either of poor quality or the essential ones are in short supply!

For instance, in a 2000-lb charge, the shortage of one pig of iron in the mix penalizes the iron 7 to 8 points of carbon; or at a coke ratio of 7 to 1, a shortage of 15-lb of coke is equal to 5 per cent of the fuel.

In connection with these potential shortages or errors, let us consider how they can occur:

1. Careless charging methods and lack of proper supervision or interest.
2. Very few scales are adequately serviced by either the shop itself or by regular inspection and adjustment by the scales representative.
3. Improper scale capacity for the range in weights of the various materials charged.

In the first instance, the obvious correction is for management to assign a responsible person to supervise all charging procedures.

In the second, all scales should be periodically cleaned and adjusted by the shop itself or during an inspection by a qualified service man. A set of scale weights should be provided.

In the third, no scale has the same degree of accuracy over its entire range. For example, a scale may have an actual capacity range of 10,000 lb even though the dial shows 3000 lb. Suppose that the charge is 2000 lb. Using a coke ratio of 8:1, we must weigh 250 lb coke, or with a short pig iron charge only 300 lb (15 per cent). These smaller amounts are subject to a considerable percentage error. Actually it would be far better to weigh the coke and the pig on separate scales having much lower capacities than the average charging scales have.

Magnet charging has many economic advantages, but there is a greater opportunity for error because of poor location of the scale dial opposite the charger and the reluctance of the charger to take time to adjust the weights of the components carefully. The total error (gross) is probably held to within reasonable limits, but the incremental amounts of the various irons can be in serious error on a charge-to-charge basis. This method of charging should provide for an adjusting platform alongside the weigh hopper and for a man to add the final amounts and "trim" the charge each time.

Volume measurement of coke is both inaccurate and unsatisfactory because no accurate record of the amounts used is possible, and cokes vary in bulk density (weight per cubic foot) because of variations in size, consistency and apparent specific gravity. Therefore, all coke charges should be weighed and, of course, all coke bed heights should be measured. Both should be recorded daily.

Charging Equipment—Each type of bucket employed with mechanical charging has its own characteristic or influence. This has been discussed in previous articles, but there are one or two points which should be observed with any charging bucket.

Improper location of the bucket "stops" at the end of the bucket's travel frequently cause uneven charges. One dislocation in this respect which was only 2 in. actual distance caused a 12 in. slope in the charge almost regularly. When this was corrected, better iron was produced with less coke.

Mechanical chargers almost universally impact materials in the cupola to a greater degree than hand charging. This difficulty can be avoided partially by slowing down the tripping of the charge and, above all else, by maintenance of a full stock height.

When coke must be elevated with the charge because of travel time limitations of the equipment, do not put the coke in the bottom of the bucket. When this is done, the coke is subjected to two or three very serious impacts—iron onto the coke in the hopper, the drop into the bucket, and the drop of the charge into the cupola. Place the coke on top of the charge in the bucket. Preferably, charge the coke by itself.

Skip chargers notoriously create an uneven charge level. Trip the skip slowly to spill the material in, or retract the stop position sufficiently to correct the trajectory of the material, or place a diverting plate opposite the charging door so that part of the charge is "kicked" back toward the center or the other side.

Air—It was shown previously that the amount of air used can vary considerably, particularly with poor coke, but this variation in air follows a definite pattern based on the fundamental laws of combustion and the condition of the cupola. It is illogical to believe that an air rate for a given cupola can be altered at will with no compensatory adjustment in the other factors involved.

There is an almost universal acceptance of air meters in the industry as part of the modern manner of operating, but most unfortunately the general attitude exists that it is not necessary to require absolute measurement of air. In other words, it is felt that if the meter indicates a reasonably accurate relative change in the air introduced, it is satisfactory for a commercial operation.

This position is totally wrong, for

(*Concluded on page* 160)

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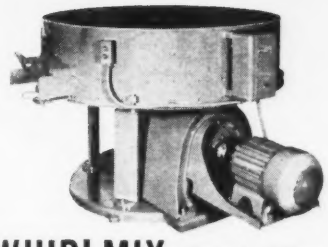

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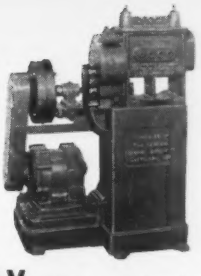

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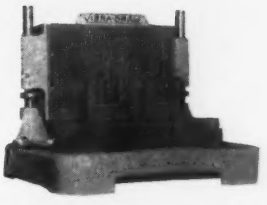

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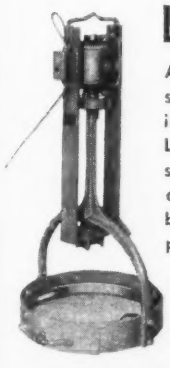

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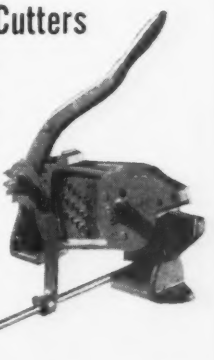

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(*Concluded from page* 158)

it presupposes a situation which is seldom encountered or maintained—namely, a perfectly balanced operation. When a meter is added to a previously balanced operation, and the operation is established to the same initial status, the meter then furnishes an index of the rate of air used. An increased melting rate will require more air, whereas a lower melting rate will require less air. The meter will, of course, permit greater control in the adjustment of the air rate, but it may or may not indicate the true rate; consequently any new rate must be discovered by a hit-and-miss process.

A good example of the above is an instance where excessive coke is being used. An air rate can be found which will produce satisfactory iron, but the melting rate, of course, will be lower than the capacity of the cupola. With a good meter installation this is easily checked by a comparison of the amount of coke used and the total air input.

To state this problem in the simplest possible terms, air must be used for the combustion of coke, coke burns in a definite manner, and optimum combustion (iron quality control) requires a definite amount of air, therefore, any change in the desired combustion rate of the coke is accompanied by a corresponding definite change in the available air.

In a period of poor materials, with the consequently general problem of carbon, it is imperative that the air be under absolute control and that the metered air be accurately registered. The daily reports will then possess a real value when they are referred to.

It must be remembered that air is the only raw material over which an operator has complete control, and it is the one component which can be guaranteed in both amount and quality. In many cases, it is the dominant factor with respect to the control of carbon in the iron.

Cupola—This subject has been discussed in the previous sections in considerable detail, and it is only necessary here to re-emphasize a few pertinent points.

The most important feature of the cupola is that of lining repairs. These should be carefully made in all respects. It is absolutely essential that the patching material be made with a tight bond to the old lining. To accomplish this, the old slag must be cleaned off completely. The new blocks or plastic must be supported with a tuyere ledge in its proper position.

In most instances the type of material used is not as important as the manner of its application. Even securely placed poor materials will do a better job than insecurely attached good materials. In the section on patching it was pointed out that if the lining slips, bridging can start immediately.

Tight joints are essential where blocks are used. Blocks should not be just set in mud.

High-clay-content mortar or patch should not be used under any circumstances. Clay shrinks excessively and shrinkage, of course, destroys the bond and permits pulling away.

The new monolithic lining material applied with a gun is an excellent patching medium. One of its principal advantages lies in the low and closely controlled moisture content, which is generally carelessly handled when the patching material is "home-made." Additionally, it is possible to make a more even and regular surface and to hold closer to the desired dimensions.

A bosh is a must for almost all cupolas, and to properly support it there must be a level and secure ledge at the top of the tuyere.

The tuyeres must be kept clear of slag and iron. Plugged tuyeres seriously disturb the distribution of the air.

The entire wind line must be tight. It is not unusual for the blower to have only enough capacity to accommodate the cupola properly. Heavy air losses will, of course, decrease the air available for melting.

Receiver—Any receiver causes a loss in metal temperature ranging from 30° F to 100° F, dependent, of course, on the rate of flow through the receivers as well as on the degree of insulation.

During recent years, when materials were very poor and difficulty was encountered in obtaining high temperatures, it was not at all unusual to bypass the receiver in order to eliminate any temperature loss from this source. It was generally felt that the loss of mixing was secondary to the gain in temperature.

When a receiver is improperly preheated, the temperature loss naturally will be aggravated. This factor should be kept in mind at all times because it is always cheaper to heat the refractory with oil or gas than it is to take the heat away from the metal.

Temperature Readings—A record of metal temperatures should be kept for each heat, and readings should be made ahead of any receiver, in order to get a true picture of the cupola metal.

The trend and level of the temperature is a highly significant index of the quality of the metal. For example, high metal temperatures with a clear surface are usually indicative of good melting conditions. Conversely, low metal temperatures accompanied by a surface "sculling" are proof positive of poor melting conditions or poor stock charge.

Changing metal temperatures during a heat generally indicates a change in melting conditions, and where a temperature log is maintained it is often possible to anticipate serious difficulty by making the necessary corrections as soon as a definite trend is detected.

Deoxidizers—It is frequently possible to improve poor metal by the addition of late silicon or other specific materials. In most instances these additions are more effective than correctives applied to the interior charges.

GANGWAY!

By J. A. PATTERSON

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STEEL FOUNDERS' SOCIETY CONFERENCE

Covers Gains In Research and Production

ADVANCES in technical and operating methods in the steel castings industry, noteworthy product engineering gains, expansion of research and wide improvements in production practices and foundry housekeeping were emphasized at the seventh annual Technical and Operating Conference of Steel Founders' Society of America.

Conference attendance of technical, operating, and management executives reached a record of 491. Continuous sessions were held at the Hotel Carter, Cleveland, Nov. 6-8.

Conference discussions covered latest developments in molding and coremaking practices, materials handling problems and equipment, foundry dust and smoke control, and melting practice. Special attention was devoted to product development; various papers highlighted the progress attributable to intensive society activity in this field.

In all, 24 technical papers and ensuing discussions arranged by Charles W. Briggs, technical and research director, and the society's 11-man Technical and Operating Committee, were devoted to these timely considerations and to specific developments arising out of the 27 major research projects carried out under the society's auspices.

Chairman of the national committee Luther A. Kleber, vice president in charge of manufacturing, General Steel Castings Corp., Granite City, Ill., opened the conference with a reference to the industrywide importance of the active technical and operating program.

Reflecting advantages accruing to steel foundries and their customers because of the aggressive engineering teamwork approach to mutual design and production problems, the session on product development keynoted the practical nature of discussion throughout the conference. Co-chairmen were T. J. Nichols, vice president-operations, Fort Pitt Steel Casting Division, Pittsburgh Steel Foundry Corp., McKeesport, Pa., and R. L. Jones, assistant works manager, American Steel Foundries, East St. Louis, Ill.

Launching the session, Ross L. Gilmore, president, Superior Steel & Malleable Castings., Co., Benton Harbor, Mich., chairman of the National Product Development Committee, spoke on "How T. & O. Can Participate in Product Development Programs." The answer, he said, is "in every way."

Product development activities were described by Mr. Gilmore as the meeting ground for every phase of a company's activities. The sales department is interested in selling a *new* product; operations in making a *simplified* product; costs in a *lower-cost* product; engineering in designing an *improved* product; inspection in passing on a *better* product; shipping in moving *more* product; and the board of directors and the stockholders are interested in a *greater profit*. All these ends, he said, can be achieved through good product development.

Summing up product development progress, Mr. Gilmore reported on initial findings in a preliminary survey conducted in 81 foundries in six of the eight geographical divisions of the society. These statistics, although inconclusive and not representative of industry-wide activity, indicated that in 18 months, a minimum of 1035 engineering conversions to steel castings had been carried out in the 81 foundries covered. The conversion total was responsible for bringing more than 41,000 net tons of new work into the industry, he reported, with added dollar value of close to $17 million.

LUTHER A. KLEBER
National Committee Chairman

Speaking from the standpoint of "The Sales Approach to Product Development," Allen M. Slichter, president, Pelton Steel Casting Co., Milwaukee, similarly presented convincing data to show that companywide co-operative interest and action is fundamental to the accomplishment of effective product development.

The value and importance of product design and development is reflected in overall progress of the steel castings industry in recent years, R. B. Cottrell Sr., chief mechanical engineer, American Steel Foundries, Chicago, said in his paper "The T. & O. Approach to Good Casting Design."

Continued efforts in this connection, Mr. Cottrell said, have highlighted the fact that many articles can be made more simply, at reduced weights and with lower costs by the casting method, as compared with competitive manufacturing methods. A corollary benefit is that the industry is looked upon with respect and confidence as producers of "engineered steel castings," with a reputation for reliability and economy.

"Casting Simplification," was the subject of a paper prepared by Carl F. Haertel, foundry superintendent, and Emil Martinek, product development engineer, the Falk Corp., Milwaukee.

Recognizing that closer co-operation is a necessary adjunct of coordinating good engineering design with good, sound casting practice, their approach emphasizes closer customer contacts, not only with purchasing agents, but especially with their engineers.

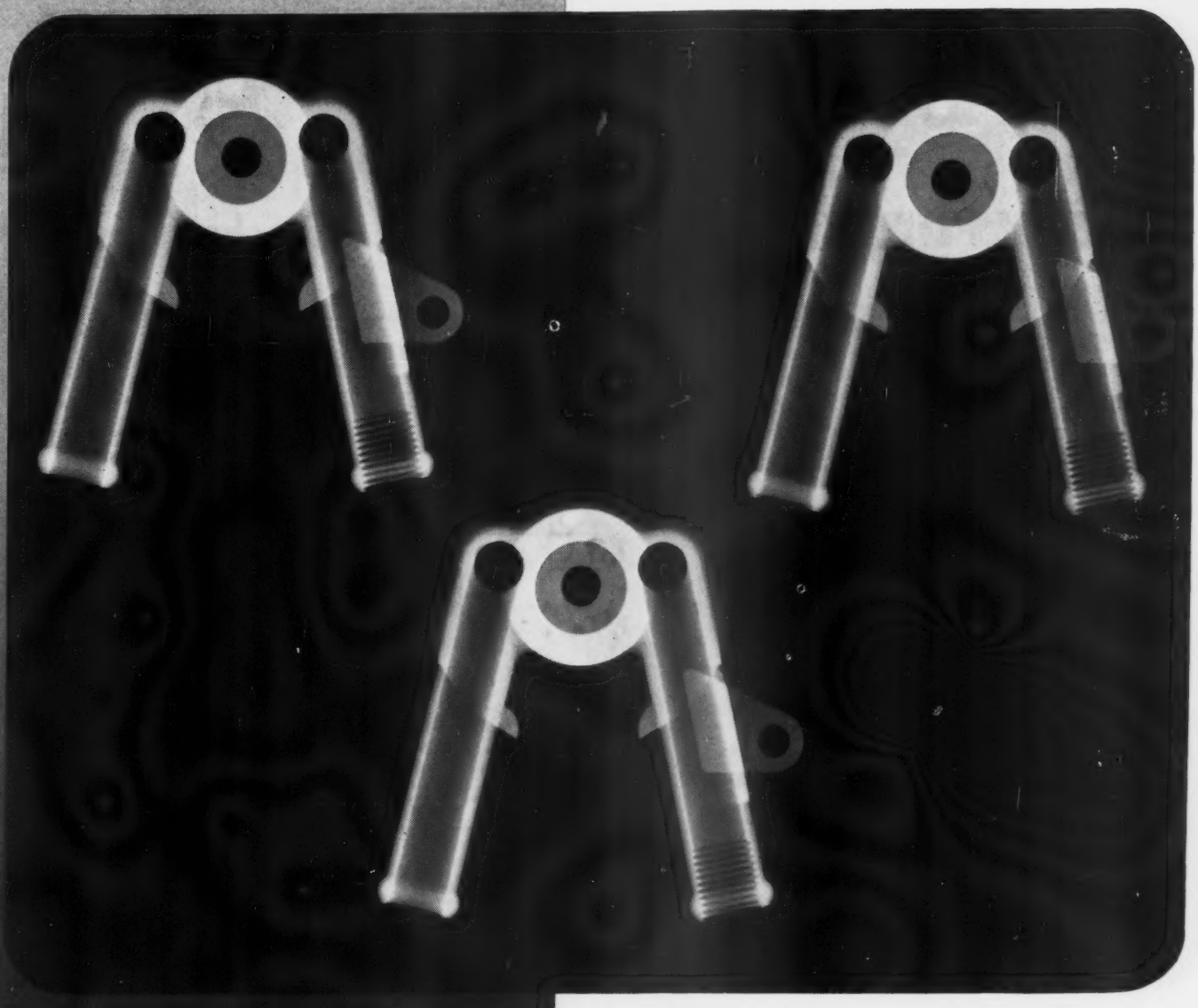
It has been the experience of his company, after several years, Mr. Martinek added, that Falk foundry engineers now are regularly being called into consultation by customers prior to final decisions on numerous new designs. A major consideration in such cases is detailed determination of proper pattern equipment and related foundry method to insure the best quality castings, together with the best possible delivery schedules.

Exhaustive details of the so-called cast-weld method of construction were incorporated in another paper, "Casting, Cast-Weldment, or Plate Fabrication?", by H. E. Edsall, plant superintendent, and F. E. Browne, service and welding engineer, Birdsboro Armorcast Inc., subsidiary of Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

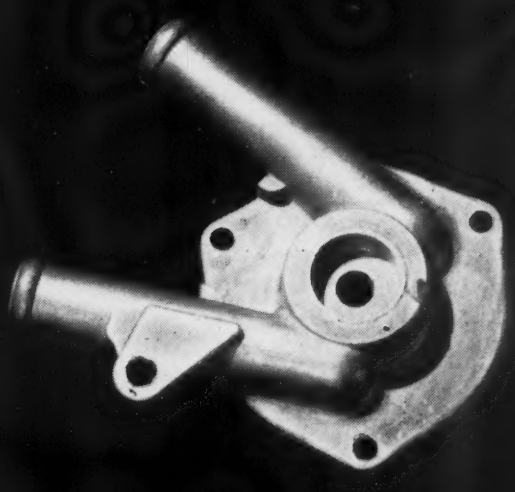
This process consists of adapting fabricating and of improving certain complicated parts by casting them in several separate pieces, each of a simple shape easily produced as a better casting, then welding the component parts together to form the required assembly. Its practical ap-

(Continued on page 165)

Radiograph of automotive heater shut-off valve.



RADIOGRAPHY
Sets the stage for high yield runs



FOR EXAMPLE, take this automotive heater shut-off valve. Radiographs of pilot castings, made prior to production runs, disclosed a few recurring areas of porosity. A minor change in casting technique brought a higher yield of sound castings.

Cases like this show why more and more progressive suppliers of castings are employing radiography. It leads to sound production quickly, lets them know only high-quality work is released.

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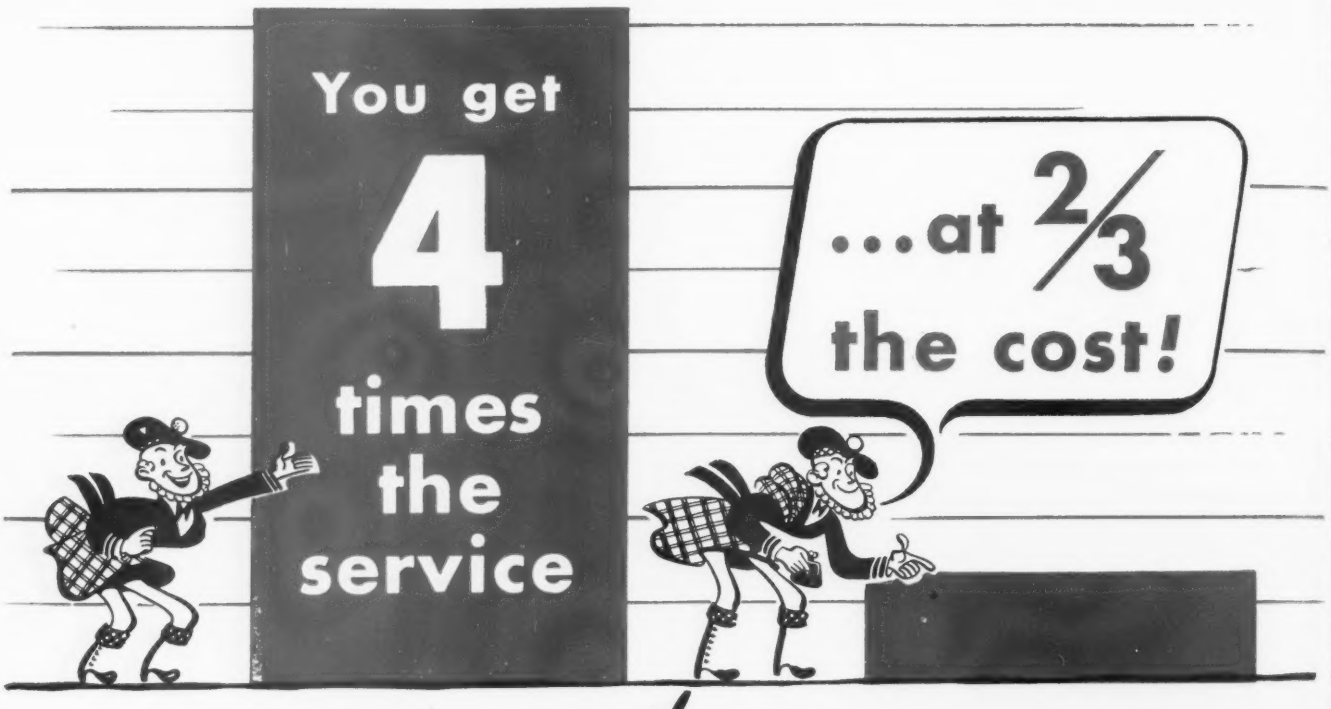

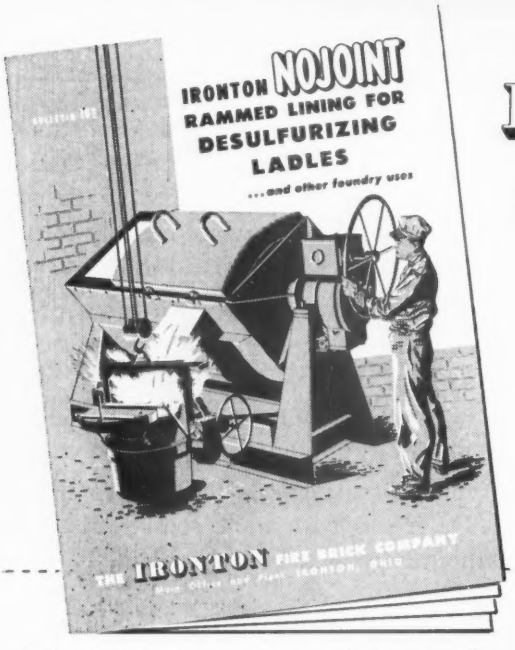

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(*Continued from page* 162)

plication permits a number of desirable advantages, Mr. Edsall reported. Among these he listed (1) lower pattern costs; (2) lower machining costs through closer adherence to finish dimensions; (3) improved damping properties as compared with all-plate or structural shape fabrication; (4) lower final cost through simplification of design; (5) better service from the foundry with employment of simpler techniques; and (6) customer acceptance.

The cast-weld principle should not, however, be considered a "cure-all" for all unprofitable or extremely intricate foundry work, Mr. Edsall cautioned. Until ample experience with the process has been gained, thorough cost studies should precede any possible breakdown of an integral unit for cast-weld procedure. In some cases, it has been found that such breakdowns can be far more costly than making a one-piece casting. In other instances, the composition of the intended casting may be the regulating factor. If it is very high in carbon or certain alloying ingredients, welding may be difficult and costly.

Latest developments in molding and coremaking were discussed in a morning-long session conducted by G. A. Lillieqvist, research director and chief metallurgist, American Steel Foundries, East Chicago, Ind.

Experimental and practical operations in "Casting Stainless Steel in Shell Molds," covering experience of Cooper Alloy Foundry Company, Hillside, N. J., since late 1950, were outlined by Wallace D. English, foundry engineer in charge of Cooper shell mold production.

In general, shell-mold castings have a much better surface than green sand castings, Mr. English said. Another definite advantage is decidedly improved yield, resulting from smaller sized runners and gates and more effective use of risers, frequently offsetting the cost of making the molds. Also, he reported, thinner and more detailed sections can be cast in stainless steel with shell molding than with sand molding methods, by virtue of greater mold permeability, smoother mold surfaces, and greater insulating effect of the mold. Cleaning costs have been found to be considerably lower, and there are substantial savings in floor space.

T. E. Padkins, assistant works manager, Scullin Steel Co., St. Louis, reviewed "Latest Developments in Molding Machines." The paper, read by T. A. Mahon, general superintendent, South Plant, described equipment and related foundry practice.

"Latest Developments in Core-Blowin," by John Mescher, coreroom foreman, Plant No. 3, Unitcast Corp., Toledo, O., covered the field of recently perfected small, medium, and large blow machines and related accessories such as blow plates and blow boxes, and suggested a variety of practical means to facilitate production on old line standard machines operating in many foundries.

Advantages in use of dielectric ovens for baking oil sand cores were reported by E. H. Blanton, foundry superintendent, and W. B. Krause, metallurgist, Atlantic Steel Castings Co., Chester, Pa., in a joint paper, "Dielectric Core-Baking."

Explaining that this phase of production accounts for two-thirds of the company's core requirements, Mr. Krause said the process has these advantages:

(1) It uses no power unless green cores are actually under the electrodes; (2) core racks are unnecessary; (3) cores are placed directly on a belt; (4) cores come off the belt cool enough to handle immediately; (5) most cores are ready to use within 20 minutes after making; (6) only one-quarter the previous number of core plates are needed, and less labor is necessary to produce the same tonnage of cores; (7) over-baking is avoided.

"Core-Blowing with the San-Blo" was discussed by K. G. Marshall, production superintendent, Atlantic Foundry Co., Akron, O.; and a following paper, "Fast Drying Core Oils," was presented by E. H. Berry, chief metallurgist, and D. C. Rose, metallurgist, both of Dodge Steel Co., Philadelphia.

A final paper in this section was "The Use of Silvacon as a filler in Core and Molding Sands," representing the joint conclusions of F. P.

(*Continued on page* 168)

Meetings of Interest to Foundrymen

Jan. 19-22—Plant Maintenance Show and Conference, Public Auditorium, Cleveland.

Jan. 23—Malleable Founders' Society, general society meeting, Hotel Cleveland, Cleveland.

Feb. 6-7 — California Regional Foundry Conference, sponsored by Northern California Chapter, AFS, and University of California, with meetings at the university and at the Hotel Claremount, Berkeley, Calif.

Feb. 12-13—Wisconsin Regional Foundry Conference, sponsored by Wisconsin Chapter, AFS, and University of Wisconsin, Schroeder Hotel, Milwaukee

Feb. 16-19—Second Annual Industrial Ventilation Conference, co-sponsored by School of Engineering, Michigan State College, and Division of Industrial Health, Michigan Department of Health, at Kellogg Center, Michigan State College campus, East Lansing, Mich.

Feb. 19-20—Southeastern Regional Foundry Conference, sponsored by Birmingham, Tennessee, and University of Alabama Student Chapters, AFS. Tutwiler Hotel, Birmingham

Mar. 2-6 — American Society for Testing Materials, spring meeting, Statler Hotel, Detroit

Mar. 11-12—Foundry Educational Foundation, annual TAC-UAC conference, Cleveland

Mar. 17-18—Steel Founders' Society, annual meeting, Edgewater Beach Hotel, Chicago

Mar. 23-27—American Society for Metals, western metal congress and exposition, Pan-Pacific Auditorium, Los Angeles

Mar. 31-Apr. 2—Magnesium Association, international magnesium exposition, Washington National Guard Armory, Washington

Apr. 9-10—Malleable Founders' Society, fourth annual market development conference, Illinois Institute of Technology, Chicago

May 4-8—American Foundrymen's Society, annual convention, Chicago

May 18-22—Material Handling Institute, fifth national materials handling exposition, Convention Hall, Philadelphia

June 8-10—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June29—July 3—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City

Sept. 21-22—Steel Founders' Society, fall meeting,, Homestead, Hot Springs, Va.

Oct. 8-9—Gray Iron Founders Society, annual meeting New Hotel Jefferson, St. Louis

Oct. 8-9—Michigan Regional Foundry Conference, Kellogg Center, Michigan State College, East Lansing, Mich.

Oct. 15-17—Foundry Equipment Manufacturers' Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

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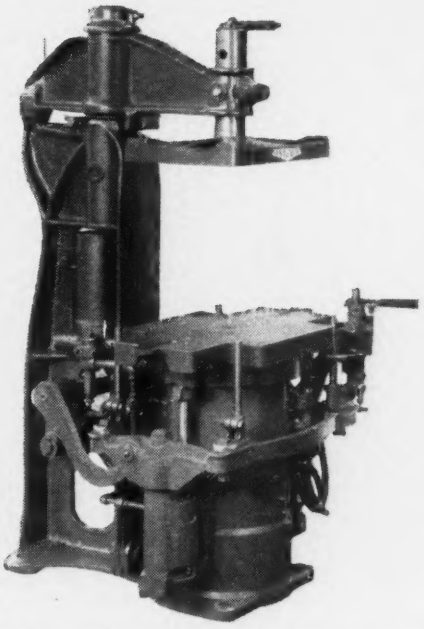

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FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

(*Continued from page* 165)

Ofner, superintendent; A. A. Belusko, sand technician; and V. E. Belusko, metallurgist, all of Electric Steel Foundry Co., Portland, Ore. Silvacon was described as a natural plastic material manufactured from tree bark, available in three varying compositions which may be used separately or in combination as a sand additive in core and molding sands to decrease sand expansion and promote collapsibility.

Among the many means by which management can increase manufacturing efficiency, by maintaining an efficient flow of materials constitutes one of the greatest opportunities and broadest challenges. This point was brought out in a series of papers concerned with "Materials Handling in the Foundry." Heading up this session was W. W. Heimberger, works manager, Buckeye Steel Castings Co., Columbus, O, with Dale Hall, works manager, Oklahoma Steel Castings Co., Tulsa, Okla., as cochairman.

H. L. McClees, president, Crucible Steel Casting Co., Lansdowne, Pa., stressed the need for foundry management "to recognize the percentage ratio of material handling costs to overall costs and to streamline supply from initial receipt of materials to outbound shipments of the finished product."

Study Materials Handling

Materials handling has been aptly referred to as "the last frontier for savings," Mr. McClees pointed out, citing that materials handling (for industry as a whole) represents 30 to 50 per cent of total manufacturing cost. Continuing studies at Crucible indicated that for each ton of castings produced, 125 tons of materials and supplies were handled.

R. C. Howell, acting works manager, American Steel Foundries, East Chicago, Ind., reported that the time involved moving materials and castings in the plant represented 40 per cent of total labor hours at the Indiana Harbor Works.

Production near capacity is 1700 tons per month and 2500 castings averaging 68 lb are processed daily. With 5282 basic tons of materials handled per day, total actual tonnage handled amounted to 19,194 tons. Consequently, for each ton of the 85 tons of castings shipped per day, movement of a total of 225.8 tons of materials was required, exclusive of tonnage handled by yards, pattern, and maintenance departments. Based on this analysis, Mr. Howell said, actual labor handling costs alone amount to 20 per cent of total costs.

"Applications of Fork Lift Truck and Load Lugger to Materials Handling," was presented by L. E. Alexander, plant engineer, Minneapolis Electric Steel Castings Co., Minneapolis. Using slides, the speaker described a wide range of functions performed by a 2-ton fork lift truck in handling materials from truck or railroad car to the warehouse and from the warehouse to the foundry. Similar utility and versatility of the load lugger, involving the use of detachable truck bodies and a mounted hydraulic hoist, also were detailed.

Since purchase of costly handling equipment cannot always be offset by

(*Concluded on page* 171)

British Study Casting Design, Research

Annual convention of the Joint Iron Council, the British organization that supports the interests of the iron castings industry and the suppliers of foundry iron, was the occasion for a meeting called by the Council of Ironfoundry Associations. Consumers of iron castings also were invited to attend. Theme of the discussion was "Co-operation between Purchaser and Supplier in its Design and Research Aspects."

The subject was discussed in three addresses. The first, by Sir Ewart Smith, director of research, Imperial Chemical Industries, dealt especially with co-operation with the research department. Referring to the productivity teams that had visited the United States, Sir Ewart said that much could be learned from America. He suggested that collaboration between user, producer, research department and designer could be symbolized in a triangle with the designer at the center, the salesman being the link between the user and the producer.

The designer uses the results of research department investigations to create new developments. When the production department receives designs, it should make suggestions for improvements and describe facilities for production to the designer, who should then go back to the user to explain how his requirements can be met better.

Sir Ewart stressed the importance of recruiting the right type of men for the design or development department, and said they should be trained in the research department and in the plants of the producer and of the user. He cited the need for a balanced organization, with close relations between departments for full collaboration, for training and experience, for proper application of research knowledge, for specialization and for standardization.

Dr. J. G. Pearce, director of the British Cast Iron Research Association, spoke on co-operation in regard to new materials and methods. He said that feverish developments are taking place in the foundry industry. Two recent examples are ductile iron and shell molding. He said that the development of ductile iron is the greatest improvement made in 25 years of research. Because it can be used best and at the lowest cost when castings are redesigned, co-operation between maker, user and designer is essential.

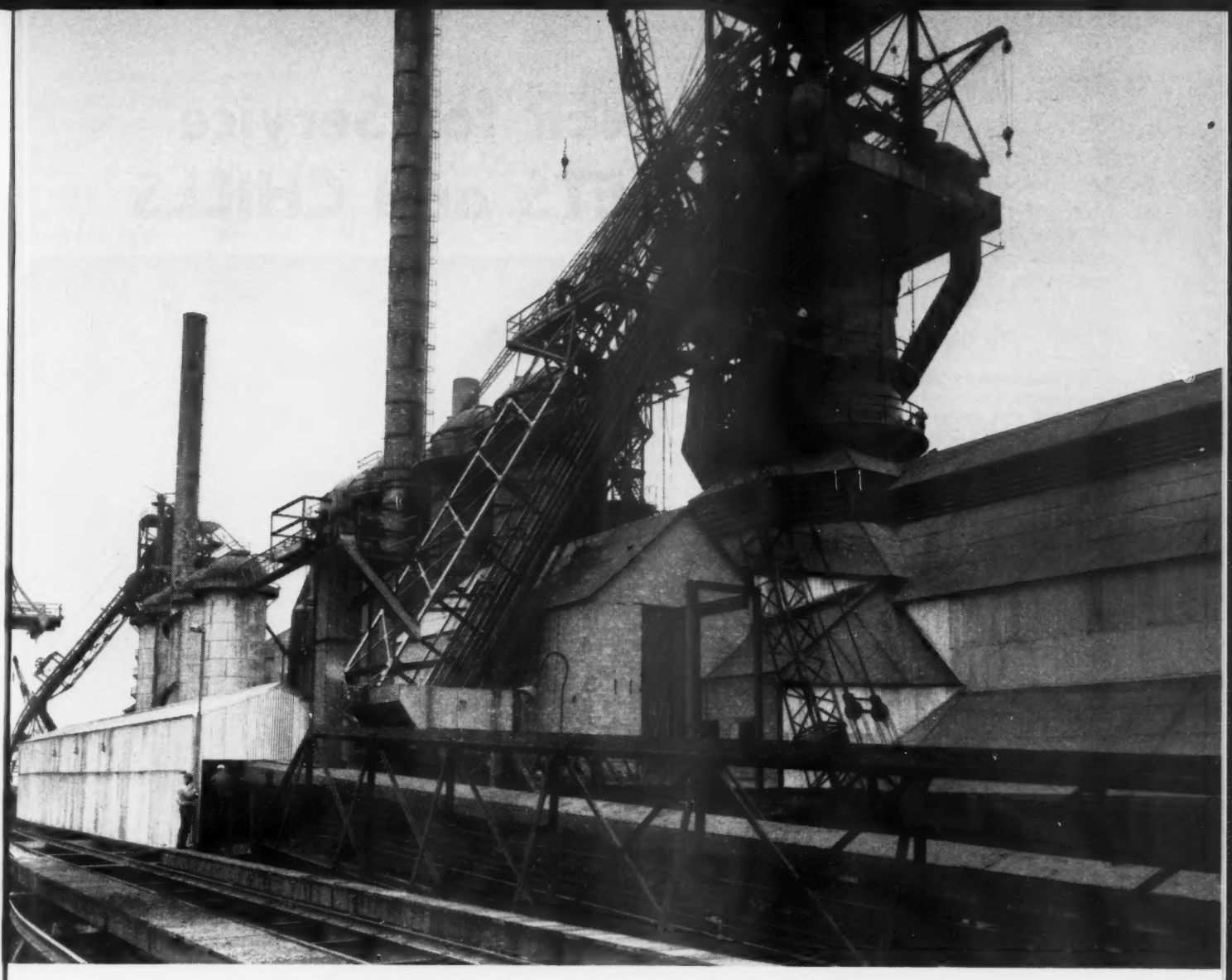
Dr. Pearce said that because shell molding requires metal patterns, cost is relatively high, and the process is practical only for high production. Here again there must be co-operation between maker, designer and user. In this case, overall cost must be considered more than mere foundry cost.

Dr. H. T. Angus, development manager, British Cast Iron Research Association, stressed that co-operation is an attitude of mind, a faculty of appreciating the point of view of the other side. He emphasized that iron specifications define an iron, but not the quality of the casting made from it. When specifications are made, account must be taken of all the factors involved in utilizing a casting.

In subsequent discussions it was argued that the producer should have direct communication with the research department. It was also stressed that the designer should have a good grounding in foundry practice. Excess of individualism should be replaced by more uniformity. Reference was made to the difficulties of inspection in many foundries and to the need for more foundry facilities for stress relieving.

Some consumers suggested that an independent panel from foundry associations should be set up to advise designers to help them to avoid any feeling of obligation to place an order with a particular foundry that studies a design. Alternatively, regional laboratories could be set up to help local foundries. The point was made that designers lack confidence in a new material such as ductile iron until more is known of its behavior in service.

The Joint Iron Council convention ended with a banquet at Guildhall at which the Rt. Hon. The Lord Mayor of London, Sir Leslie Boyce, was the principal guest, supported by the Rt. Hon. Sir Walter Monckton, minister of Labor and National Service. F. Scopes, president of the Joint Iron Council, was chairman.



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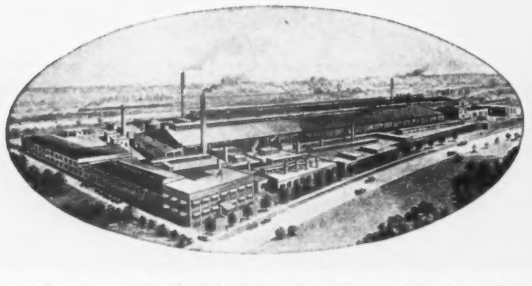

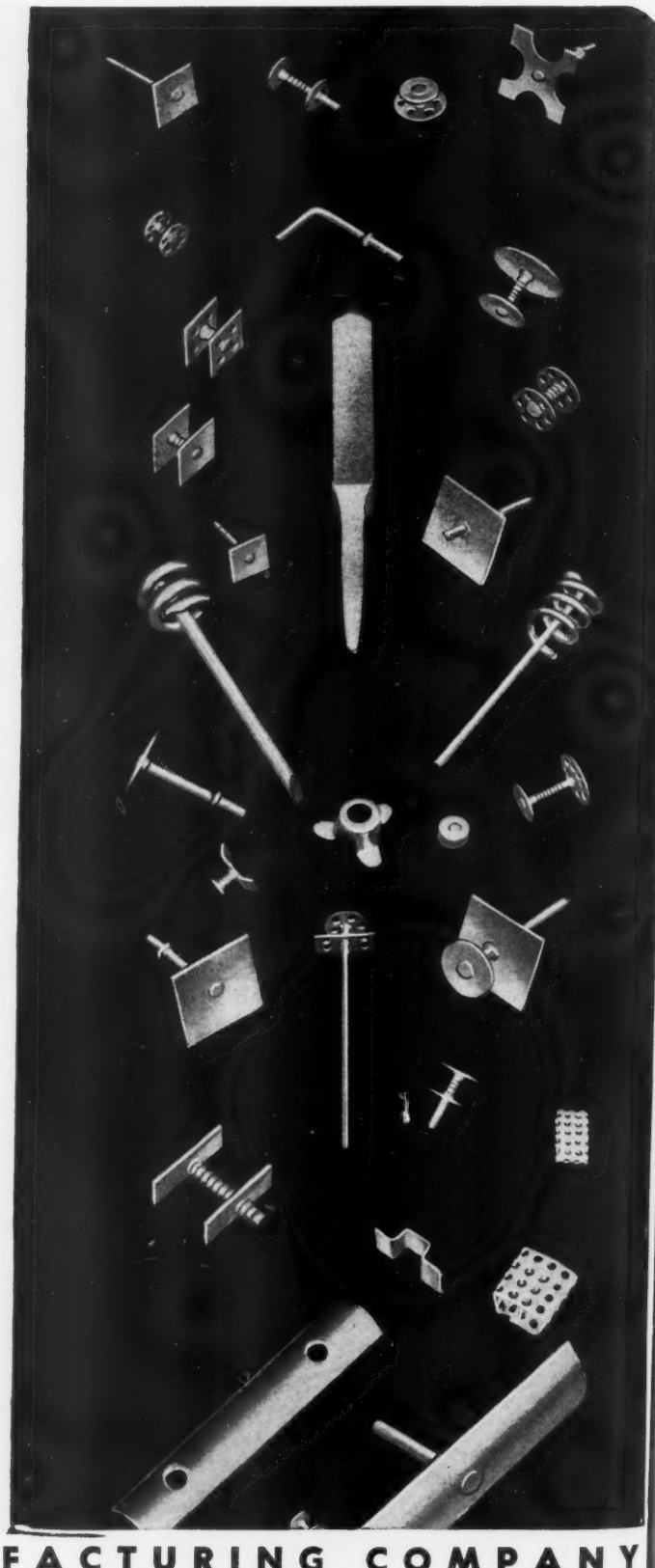

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(*Concluded from page* 168)

an overall saving in the small shop, acquisition should be based on original cost, upkeep or maintenance, estimated economies, and prospective reduction of employee fatigue or effort, Dean Van Order, methods and standards engineer, Burnside Steel Foundry Co., Chicago, said in his discussion of "Lift Trucks versus Conveyors."

Foundry smoke and dust control and measures employed in many steel foundries to cope with the problem, were the subject of another half-day session, at which R. L. Jones, assistant works manager, East St. Louis Works, American Steel Foundries, and Domenic Coccione, superintendent, Washington Iron Works, Seattle, presided.

Key To Better Work

Various papers emphasized the overlying conclusion that an effective industrial health program in the foundry means good dust control, and that good dust control—like good production method—is a key to better work, workers, attitudes, health, community relations and profits.

Specific discussions included: "Can You Get Along Without a Dust Control Program?", by B. D. Bloomfield, Michigan Department of Health, Lansing; "Control of Particle Emission from the Foundry," by P. E. Crow, Westlectric Castings Inc., Los Angeles; "Smoke and Dust Control in the Foundry," by J. M. Kane, American Air Filter Co., Louisville, and Ray Munson, Maynard Electric Steel Casting Co., Milwaukee; and "Foundry Control of Smoke and Dust," by G. C. Schreiber, Claude B. Schneible Co., Detroit, and H. I. Rekart, plant engineer, National Malleable & Steel Castings Co., Cicero, Ill.

Considerations of foundry melting practice were the focal point of a concluding technical session conducted by E. H. Berry, chief metallurgist, Dodge Steel Co., Philadelphia, and G. A. Lillieqvist, American Steel Foundries.

Among the papers were "Effect of Titanium on Medium Carbon Steel," by Earl Bewig, St. Louis Steel Casting Co., St. Louis; "Use of Rare Earths," by Francis W. Boulger, Battelle Memorial Institute, Columbus, O.; "Acid vs. Basic Open-Hearth Melting Practice," by J. M. Dugan and Arthur Cross and Walter Lynn, Ohio Steel Foundry Co., Lima, O.; "Influence of Acid and Basic Electric Furnace Melting on Hot Tears and Fluidity," by P. J. Neff, American Steel Foundries, East Chicago, Ind.; and "Quick Chemical Analysis," by D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.

Develops New Squeezer Type Machine

By RALPH L. LEE

FOR the past five years the research division of the Lee Hobby Foundry (Ralph Lee) has been talking about and working on a method of making sand molds with compressed air applied against a thin rubber blanket. Essentially, the machine is of the squeezer type but with the typical squeezer board replaced by a pneumatic rubber diaphragm head unit. This diaphragm presses or packs in one quick operation all of the sand required to fill the mold with even pressure over the entire surface of the pattern.

Since the beginning of this research project the rubber diaphragm principle suggested the development of a low-cost machine which would provide the following features:

1. Uniform mold hardness. With only the interference of a thin sheet of rubber the air pressure applied naturally equalizes itself over the entire mold area and packs the sand evenly, regardless of pattern contour.

2. Low air pressure and volume requirements. To produce a hard mold the machine required only 20 pounds air pressure, and the amount of air used for each mold represents the difference between the bulk of the loose sand and the packed sand.

3. Silent operation. Exhaust is the only noticeable sound, and even this can be muffled.

4. Increased flowability of sand. The rubber diaphragm actually tucks in soft corners and pockets even in a deep flask and provides surprising hardness on vertical surfaces.

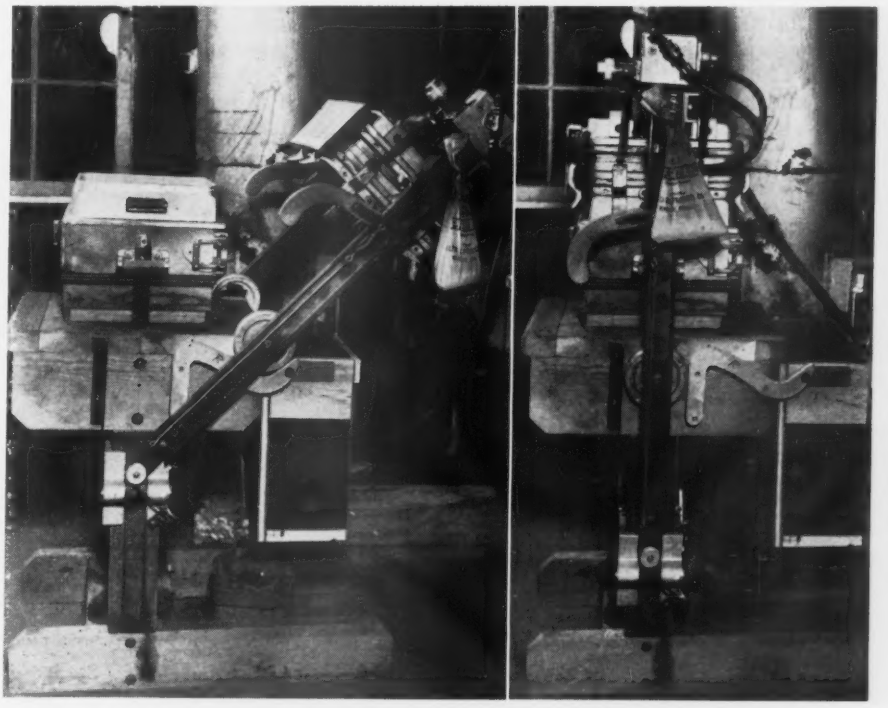
5. Increased life of patterns. With a minimum of stress between high spots on the pattern and the squeezer head, patterns are spared.

6. Accurate mold hardness control with inexperienced operators. An automatic, snap-action pressure valve provides instant and accurate hardness control with micrometer adjustment. (Hardness remains constant regardless of air line variation.)

7. Low maintenance cost. With a surprisingly small number of parts, and the simplest of mechanical movements and components, there is very little to wear out.

In the early days of the project the life of the rubber diaphragm was a serious question, but experience has proved that the rubber does little, if any, work; it merely serves as a gasket for preventing the air from blowing through the sand. With hundreds of molds made, the first diaphragm is yet to break.

The research division of the Lee Hobby Foundry is very much encouraged by the reaction and comments of several of the nation's leading foundrymen who have seen the machine in operation. Arrangements have already been made for a number of machines to be tried out under operating conditions in production foundries.



Two views of the machine, showing head unit swung back at the right

New Investment Foundry

(*Continued from page* 93)

bubble of metal will later result which may cause rejection.

The equipment is relatively simple; constant agitation is required, in a suitable container which can be readily cleaned to prevent buildup of dipcoat. One significant and important point needs to be mentioned. With constant agitation, a rise in temperature is apparent, and frequent checks must be made to keep the dipcoat as close to room temperature as possible.

Flasks—Flask lining and mounting require little discussion. Care must be exercised to center the cluster within the flask itself (Fig. 7). Selection of flask size is important; a minimum of ¾ to 1 in. of investment from the cluster to any point within the flask must be allowed. Using a lesser amount or improperly placing the cluster invariably results in investment fracture during dewaxing and preheating, and causes rejections due to inclusions. Proper sealing of the flask to the bottom plate is also important, for during investing any leakage at this junction will result in improper packing.

At this point it is significant to note that all the forementioned operations are performed in one room. This arrangement is necessary since we are dealing with wax patterns susceptible to thermal variations which can lead to considerable difficulty once patterns have been dipcoated. A wax pattern cluster which has been acclimated to a temperature of 75° F will expand after dipcoating if it is allowed to remain in a room where the temperature rises to 85° F. The nonresilient dipcoat will be stressed, and fine-line cracks not normally visible to the naked eye will form. The vehicle in the investment will seep through these cracks and cause the dipcoat to part from the pattern.

During the subsequent preheating cycle the liquid breaks down. Residual silica remains, however, and causes a lacey surface and a dimensional growth on the pattern which in many cases cause rejection. To eliminate occurrence of these conditions, this room is being provided with air conditioning to maintain a uniform temperature during the summer months and with thermostatic heating controls to do the same during the winter.

Investment Preparation—Considerable thought was given to the manner in which investment is prepared and transferred to the holding bins (Figs. 5-6). A double-cone blender for dry blending is charged by a skip hoist. After 30 minutes of blending, the entire load of 2500 lb is discharged into a holding hopper. A sample is taken by the process control department, quartered and checked for screen size, packing time and gelation.

Once approved, it is placed over a floor hopper and discharged, whereupon it is lifted by a bucket elevator onto a belt conveyor, which carries it to the holding bin located over the investing wet blender. It is imperative that no segregation occur at any point of transfer, for an excess of fines results in prolonged packing time. Conversely, rapid packing occurs with an excess of coarse particles.

Binder Preparation—The predominant binder used at Whitehall Divi-

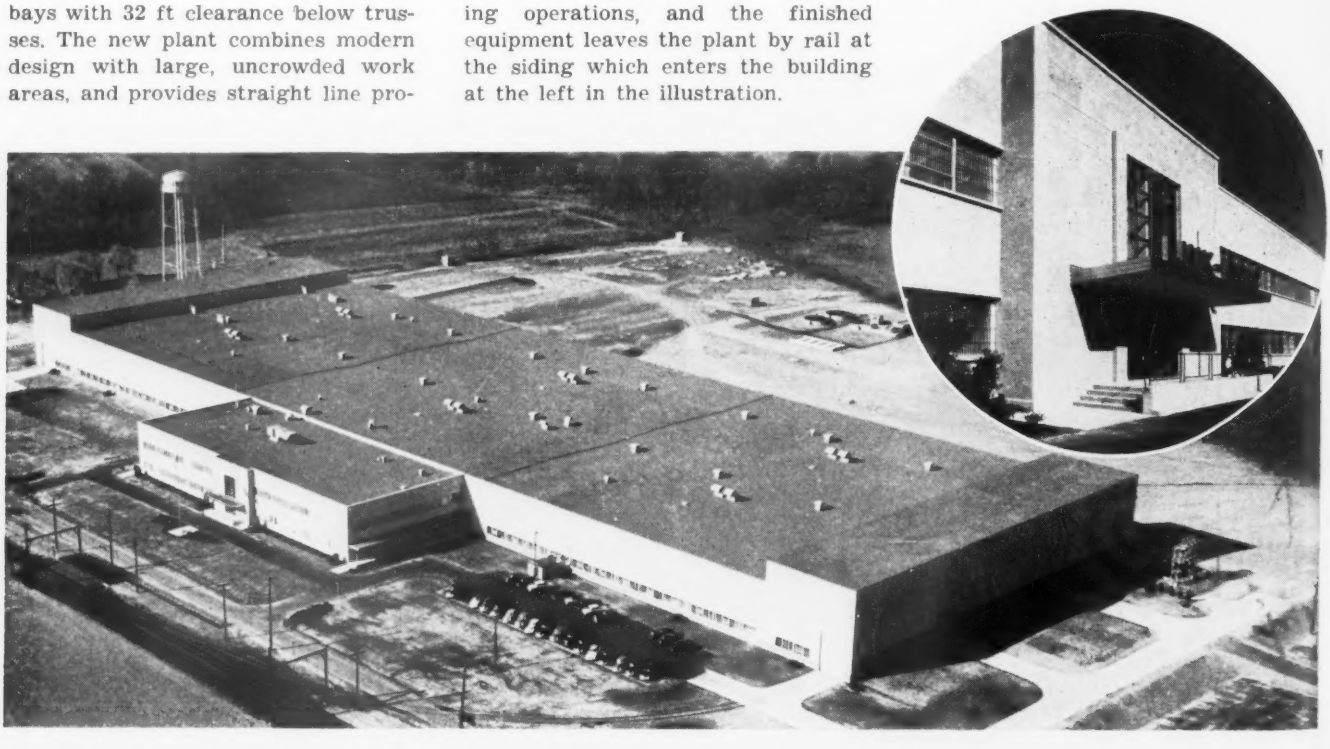
(*Continued on page* 174)

Link-Belt Opens New Plant

A NEW plant for the production of conveying and processing equipment has been built by the Link-Belt Co. at Colmar, Pa., 25 miles north of Philadelphia. The plant is 880 ft long, 300 ft wide and has crane runways in four of the five production bays with 32 ft clearance below trusses. The new plant combines modern design with large, uncrowded work areas, and provides straight line production with great flexibility.

Raw materials are received by rail siding which enters the building at the right in the accompanying illustration, or by truck at a receiving dock at the same point. Material moves through the various processing operations, and the finished equipment leaves the plant by rail at the siding which enters the building at the left in the illustration.

During the first week of December, a large number of engineers, industrialists, civic leaders and representatives inspected the new plant. Openhouse for the families of employees, stockholders and the people of the community was held on Saturday of that week to provide an opportunity for all to see the new plant.



Chicago's Board of Trade Building, on Jackson Boulevard at LaSalle Street.

Kaufmann & Fabry Photo

CHICAGO

foundry market area number one

There are 256 foundries in the Chicago area, the nation's number one foundry market. They produce over a million tons of castings per year and provide employment for more than 32,000 people. A substantial number of the area's foundries are high-production shops—thirteen of them employing 500 or more people. The number one area is well diversified as to type of castings produced and metals cast. There are 89 gray iron foundries—many of which effect important economies by using ANNEALSHOT and/or SUPER-ANNEALSHOT. Complete information and prices on these high quality, economical metal abrasives will be forwarded promptly in response to your inquiry.

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(*Continued from page* 172)

sion at present is ethyl silicate. Its preparation is carried on in a specially designed safety room which has a blow-out hatch and a low and high level exhausting system. This is imperative as we are dealing with alcohol solvents which are required in the preparation of the binder.

Binder tanks are installed on a balcony within this room and consist of five separate units, each capable of holding 250 gallons of prepared binder. By having separate units we are able to store the binder for the period required to fully evaluate the gel time and the green or setting strength by crush tests and packing characteristics. If no adjustments are required, the batch is released for production.

The feed line to the investing area is through gravity piping which is inter-connected to a manifold leading into each tank. This system is very effective and minimizes the hazard of fire and costly small-batch methods, because of restrictions imposed by fire inspection regulations.

Investing—Wet blending (Figs. 8-9) is done in a modified cement mixer lined with rubber. Dry investment is discharged through a volume-metered chamber and into the mixer. The binder is measured by a flow meter in correct proportions. This ratio must be controlled carefully to obtain the best packing characteristics. The actual investing operation consists of transferring the thoroughly mixed investment into and around the dipcoated wax pattern cluster while it rests on a magnetic vibrator.

This step is very important, for if the amplitude is such that it transmits a transverse motion, which we call flutter, to the pattern cluster, we find that during the course of filling, this motion will displace liquid from within the investment along the surface of the pattern. Ultimately, this liquid will be volatilized, and the volume that it displaced will result in a dipcoat buckle and cause a reject. This is particularly true of large surfaces such as are found in turbine vanes and blades.

Other precautions are necessary, such as the elimination of liquid entrapment under flat surfaces. Rate of filling must be watched particularly with parts having cored holes. Many causes for rejection are directly related to this department, but provision of adequate equipment and analysis of castings after shake out, can hold them to a minimum.

Dewaxing and Preheating—Dewaxing ovens at Whitehall were specially designed to fit our needs. They are complete in all details in that they provide for control of increase of temperature by means of a programming instrument. Air recirculation automatically changes from 100 per cent exhausting to a percentage-recirculation. The oven is equipped with all the safety controls necessary to make it explosion-proof.

The two continuous preheating furnaces, 40 ft long, are divided and controlled in five zones. The first three zones range in temperature from 375° F at the entrance to 1500° F at the end of the third zone. The

(*Continued on page* 176)

Castings Prominent at Metal Show

FOUNDRIES were prominently represented at the National Metal Congress and Exposition held by the American Society for Metals at Philadelphia, Oct. 18-24. Companies displaying castings exceeded in number those showing any other type of engineering material or component. Among the 400 exhibitors, 27 were foundries, while displays also were conducted by the Gray Iron Founders' Society and the Steel Founders' Society of America. Views of the society booths are shown here.

Foundries sponsoring exhibits included: Acco Castings Division, American Chain & Cable Co. Inc., Bridgeport, Conn.; Alloy Engineering & Castings Co., Champaign, Ill.; American Brake Shoe Co., New York; American Non-Gran Bronze Co., Berwyn, Pa.; Ampco Metal Inc., Milwaukee; Arwood Precision Casting, Brooklyn, N. Y.; Beryllium Corp., Reading, Pa.; Casting Engineers Inc., Chicago; Crucible Steel Co. of America, New York; Dow Chemical Co., Midland, Mich.; Driver-Harris Co., Harrison, N. J.; General Alloys Co., Boston; Haynes Stellite Co., Kokomo, Ind.; Hitchener Mfg. Co., West Hartford, Conn.

Also Howard Foundry Co., Chicago; International Nickel Co., Bayonne, N. J.; Janney Cylinder Co., Philadelphia; Lynchburg Foundry Co., Lynchburg, Va.; Michiana Products Co., Michigan City, Ind.; Michigan Steel Casting Co., Detroit; National Precision Castings Co., Clifton Heights, Pa.; Ohio Steel Foundry Co., Springfield, O.; Philadelphia Bronze & Brass Co., Philadelphia; Precision Metalsmiths Inc., Cleveland; Rolle Mfg. Co. Inc., Lansdale, Pa.; Standard Alloy Co., Cleveland, and United States Pipe & Foundry Co., Burlington, N. J.

a good turn for large metal patterns

This big Bullard Turning Lathe is an unusual piece of equipment to be found in a pattern shop . . . its normal habitat is the production line where volume output offsets its investment. At City Pattern it is used to machine large metal patterns because it provides accuracy at maximum economy of time and money.

This is another indication of the unusual facilities to be found at City Pattern Foundry & Machine Co. for the crafting of the finest in metal patterns and other foundry equipment. Such facilities, manned by experienced hands, are your assurance that a pattern bearing this name has been produced accurately and by the most practical and economical modern methods. These "stand-out" facilities, coupled with conscientious effort to produce the best in patterns, are the very reasons that leading manufacturers rely on City Pattern Foundry & Machine Company for patterns that stand out in use.

City Pattern Foundry & Machine Company's Shrinkage Conversion Tables save time and eliminate errors in shrinkage calculations. Your letterhead request will bring a set of these handy tables without obligation.

40th Anniversary
1913-1953

Setting the Pattern in Patterns

CITY PATTERN
FOUNDRY AND MACHINE CO.

1161 HARPER AVENUE • DETROIT 11, MICHIGAN

Large Bronze Statue Honors War Dead

THE MEMORIAL erected in the main concourse of the Pennsylvania Railroad's 30th Street Station, Philadelphia, is in recognition of its more than 1300 employees who died in World War II, when 54,035 men and women of the Pennsylvania Railroad served in the armed forces. The memorial, 37 ft 7 in. high and weighing 10½ tons, is one of the largest cast bronze statues ever made, exceeded only by bronze figure of William Penn, atop the Philadelphia City Hall. Sculpture suggests Archangel Michael, Angel of Resurrection, holding figure of uplifted soldier in his arms.

The bronze shaft is set upon a black granite plinth 2 ft high, which carries the lines of the bronze directly to the floor. The helmet and ammunition belt are carved in high relief on the front of the block. Repaving a square of the floor immediately around the base with tiles of the same black granite, gives a look of stability to the tall group.

Designed by Walker Hancock and cast by the Roman Bronze Works Inc., Corona, L. I., the plaster pattern was divided into 16 sections, cast separately and provided with roman joints. Afterward the sections were keyed and bolted together on the inside, welded along the joints on the outside. These areas were hammered and scraped to present a smooth, even surface. With an approximate thickness of 3 in., the joints provided admirable reinforcement for the entire structure. The group was cast in plaster piece molds by the lost wax process.

The four sides of the base carrying the inscriptions were cast separately in sand molds, from masonite and wood patterns, and then welded together. Before it left the foundry, the group—without the wings—was set upon the base, then lowered to the floor and the wings were welded in place. The group was shipped in one piece. The base was shipped separately.

(*Continued from page* 174)

next two zones are maintained at the desired holding temperature, which may vary from 1600 to 1900° F.

Each zone is controlled by means of a recording potentiometer, and frequent orsat checks are made to determine the O_2 content. An oxidizing atmosphere is necessary to volatilize completely the hydrocarbons resulting from residual wax in the mold. Additionally, zones four and five are necessary to insure complete acclimation of the mold to the temperature required.

Molds travel through the furnace on Michigan Steel's high alloy steel roller conveyors and trays and have been very satisfactory at these elevated temperatures.

Casting—The casting department is equipped with indirect electric arc furnaces which were designed with our assistance and are new in all respects. They contain an air-operated mold clamp system, cam-operated air inlet for pressure casting and reactors for holding temperature prior to pouring, and are lined with preformed, prefired, magnesite crucibles. Temperature checks are made by a radiomatic instrument which is recorded and visible to all operators.

Much can be said about this department and its effect on quality and economy. Metallurgical control is so imperative to meet aircraft requirements, both chemically and physically, that the casting department comes under direct control of the metallurgist. At this point considerable cost has gone into the preparation of the mold, so that if sufficient care is not exercised in such matters as mold handling, temperature control, rate of pouring as controlled by the inversion of the furnace and prevention of superheating of metal, much can be lost. Here we feel that the equipment which has been provided keeps the element of human error to a minimum. It still, however, is a department which requires the utmost supervision.

Shakeout and Cleaning—After cooling to room temperature, molds are shaken out by a pneumatic hammer. The spent investment falls through the floor into a hopper, from where it is lifted by a bucket elevator, charged onto a belt conveyor and carried to a hopper located outside the building. The hopper is elevated so that it can be discharged easily.

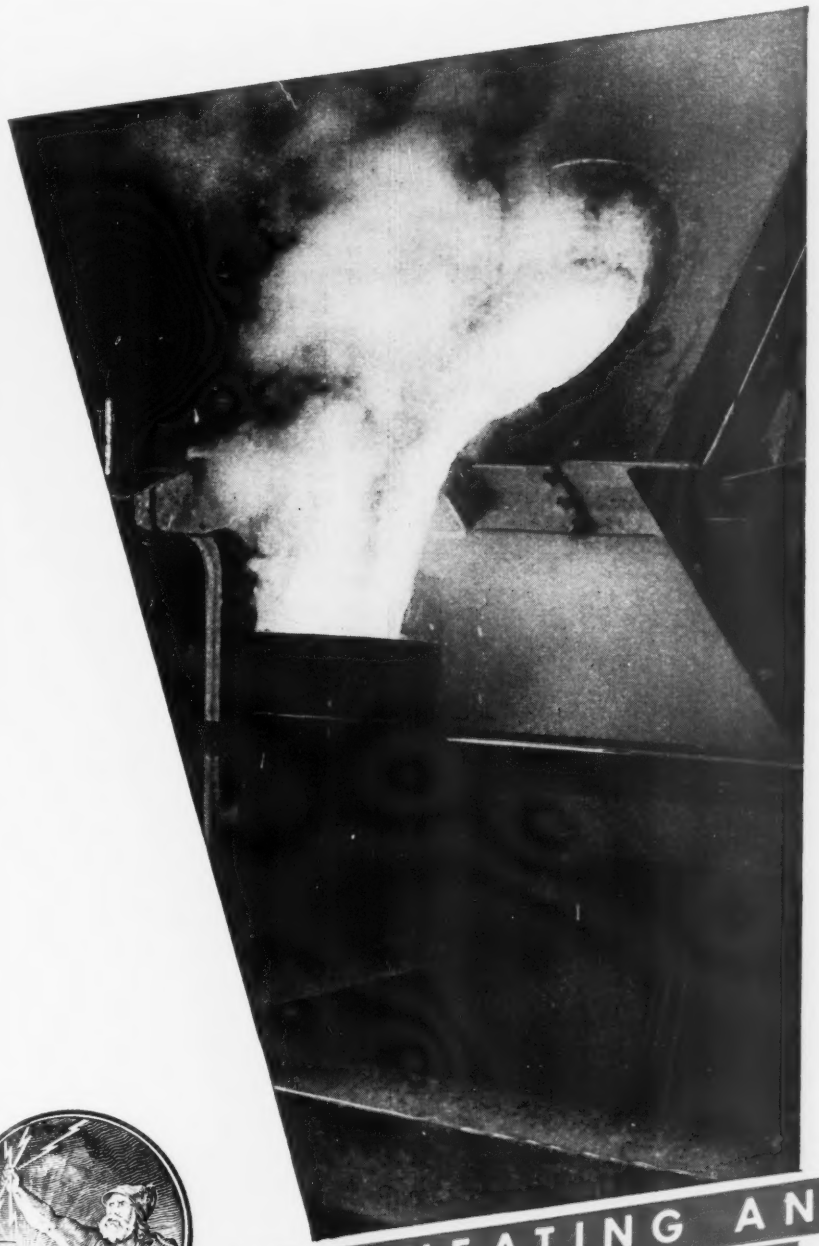
Castings from the shakeout are all properly tagged by a traveler as to the alloy and heat used for that particular lot. This traveler stays with the lot from this station until it is ship-

(*Concluded on page* 178)

Alloy savings

PAY FOR AJAX-NORTHRUP FURNACES

in three years



Induction melting saves tons of ferrochrome a month in one east coast stainless steel foundry . . . metal that was previously "burned up" in other electric furnaces.

With a three shift monthly melting capacity of 1,000,000 pounds, a 2% reduction in chromium losses made the difference. Dollar savings up to $60,000 a year are enough to pay for the equipment in a year and a half—three years on a reduced schedule.

This is only the beginning—savings in other critical and expensive alloys are also appreciable. Here are typical metal recovery figures from another Ajax-Northrup foundry melting 18-8 stainless:

Ni:	100%	Cr:	99%	Mn:	90%
Si:	94%	Mo:	95%	Cb:	92%

Besides saving metals, Ajax-Northrup furnaces melt at high speed, with extremely close control of analysis and temperature. A typical foundry, with never more than one 600-pound furnace in operation on a two shift basis, pours almost 250,000 pounds of high-melting point alloys a month. Pouring temperatures are controlled within 20°F, composition of every element within 0.25%

Performance like this can save critical alloys for you, too. Whether you melt 8 ounces of platinum, or 8 tons of steel, write us today.

SEND FOR NEW INDUCTION HEATING AND MELTING BULLETIN

140

FOR HEATING AND MELTING

AJAX NORTHRUP

Associate Companies

AJAX ELECTRO METALLURGICAL CORP.
AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC.
AJAX ENGINEERING CORPORATION

AJAX ELECTROTHERMIC CORPORATION

AJAX PARK
TRENTON 5, NEW JERSEY

(*Concluded from page* 176)

ped, and at all times it is possible to trace back any castings which may be rejectable on the basis of chemical or physical properties.

Castings are then routed to the cleaning room, where they are sandblasted prior to being cut off.

The cut-off operation is performed by either a friction saw or a rubber wheel cut-off machine, depending on the alloy. Castings are then sent into the inspection department for visual inspection.

Finishing Department—The finishing department (Figs. 17-18) performs such functions as grinding the gate, belt sanding airfoil sections, removing pits caused by bubble entrapment in dipcoat, blending pits permissible by virtue of drawing tolerance, and similar general surface improvement as required by the customer. This department more than any other is dependent on the training ability and skills of the foreman and the employees. Most of the work performed is manual and, particularly with such work as vanes and blades, the polishing of airfoils must be done precisely.

Close supervisory control is necessary to obtain maximum efficiency in the employees. The best methods must be employed, and operators must know what is required of them as to the degree of finish, permissible defects, and requirements of the customer. At all times the supervisor observes the quality of work coming into his department. In order to keep his finishing time to a minimum, he must become fully familiar with the phases of operations which may cause him undue work and report them to the project engineer accordingly. Needless to say, manual operations must be kept to a minimum, for all preceding economies can be negated quickly if excess work is required.

The processing of the castings before shipping is simple. After finishing, they are given to inspection for a visual and dimensional spot check. Castings requiring Zyglo and x-ray are routed to those departments, where they are checked for defects according to Air Force and customers' standards. All acceptable parts are then given a final sandblast and finally routed to shipping, where proper identification is given each part by either rubber stamping or electro-etching. Parts are carefully wrapped according to requirements, suitably boxed and shipped.

Laboratory Control—Metallurgical, chemical, Zyglo and x-ray inspection are imperative. Chemical checks are made constantly to insure adherence to customers' specifications. Without adequate facilities it would be extremely difficult to accomplish this.

The specifications imposed by the gas turbine field make it imperative that complete laboratory facilities be available. We have provided for this need by installing a complete chemical, Zyglo, x-ray and metallurgical laboratory. These laboratories are headed by our metallurgist, who has full responsibility for acceptance of master metal shot and controls remelt chemistry of castings. He also issues certifications as required by the customer.

In addition, castings are x-rayed, Zygloed and inspected to customer and Air Force standards. The laboratory is also utilized by the process control department for analyzing raw materials, process materials, and general control throughout the plant. The economies resulting from laboratory control and process control are somewhat intangible, but our experience makes us feel that these controls are an absolute must to insure maximum quality and meet the competitive market.

Conclusion—In view of the ever expanding demands on the investment process, we feel that the Whitehall Precision Casting Division, with its facilities and staff is now capable of undertaking in larger proportions the production of components in aircraft gas-turbine fields, industrial castings, and specialized applications we have heretofore not attempted because of size limitations. We realize that the investment casting field is still in its infancy, but we can visualize castings weighing up to 100 lb becoming a commonplace reality!

AFS PLANS TECHNICAL PROGRAM

For 1953 Annual Convention

PLANS rapidly are taking shape for a comprehensive technical program to be presented at the 1953 annual convention of the American Foundrymen's Society. The meeting, to be held in Chicago, May 4-8, will place primary emphasis on the technical sessions since the exhibit of foundry equipment and supplies will not be staged this year.

An ample supply of hotel accommodations is expected to be available in Chicago for convention visitors. Applications for room reservations will be mailed this month from AFS headquarters to society members.

Among the subjects tentatively planned for discussion at technical sessions of the various divisions are the following:

The Light Metals Division (formerly the Aluminum & Magnesium Division) will sponsor two papers on shell molding, three papers on permanent molding, two on titanium. In all, to date, the Light Metals Division will sponsor 12 technical papers. The division's roundtable luncheon will feature a discussion on "Why Surface Finish Requirements on Castings?"

The Brass and Bronze Division will schedule papers on "Effect of Mold Material on 85-5-5-5", "Melting Losses in Brass Foundries", "Perlite and its Application in Brass and rBonze Sands", "The Effect of Defects on Certain Physical Properties of Bronzes," "Symposium on Fracture Test," and possibly a paper on "Pinhole Porosity in Large Bronze Propellers." The division's Shop Course Subcommittee will schedule shop course sessions on "Furnace Operations, Melting and Refractories" the first two evenings of the convention. The division will also sponsor a roundtable luncheon.

The Educational Division will schedule a dinner during the convention, in addition to two sessions. At the first session, two papers will be presented on what is lacking in educating men for the foundry industry and what can be done to remedy the situation. During the second session papers on in-plant training will be presented by management personnel.

The Pattern Division will sponsor a roundtable luncheon and one technical session. During the session, papers on "Patterns for Shell Molding" and "Evaluation of Pattern Castings" will be presented.

The Steel Division is scheduling four sessions. Hot tears in steel casting will be a subject under discussion.

The Gray Iron Division will schedule papers on cupola operation, gray iron machinability, fundamentals of solidification, etc. In addition, a roundtable luncheon will be scheduled during which scrap reduction will be discussed.

The Malleable Division is scheduling papers on "The Effect of Phosphorus," "Melting Furnace Atmospheres," "The Effect of Boron," "Batch Melting Furnace Refractories and Operation," "Duplex Furnace Refractories & Operation," and "Selection of Refractories, Duplex Melting Cupola Electric."

The Sand Division is scheduling reports of eight committees and subcommittees. It also is scheduling a paper on shell molding and a paper on prevention of sand segregation in storage.

The Sand, Gray Iron and Steel Divisions are jointly sponsoring a symposium on sand reclamation during which wet, dry, and composite method of sand reclamation will be discussed in two sessions.

The Timestudy and Methods Committee will sponsor two sessions during which indirect labor incentives, core finishing standards, and conveyor molding standards will be treated.

The Gray Iron Shop Course Committee will sponsor three sessions. Discussions will be on gating, risering, pouring and their relations to scrap, chill testing as applied to gray iron practice, carbon control in the cupola.

The Sand Shop Course Committee will also sponsor three sessions. Discussions on pinholes in castings; evaluation of molding processes—green sand molding, permanent mold or die casting, shell molding, core sand molding and dry sand molding; and mulling techniques in relation to casting quality are scheduled.

The Heat Transfer Committee will present a committee report.

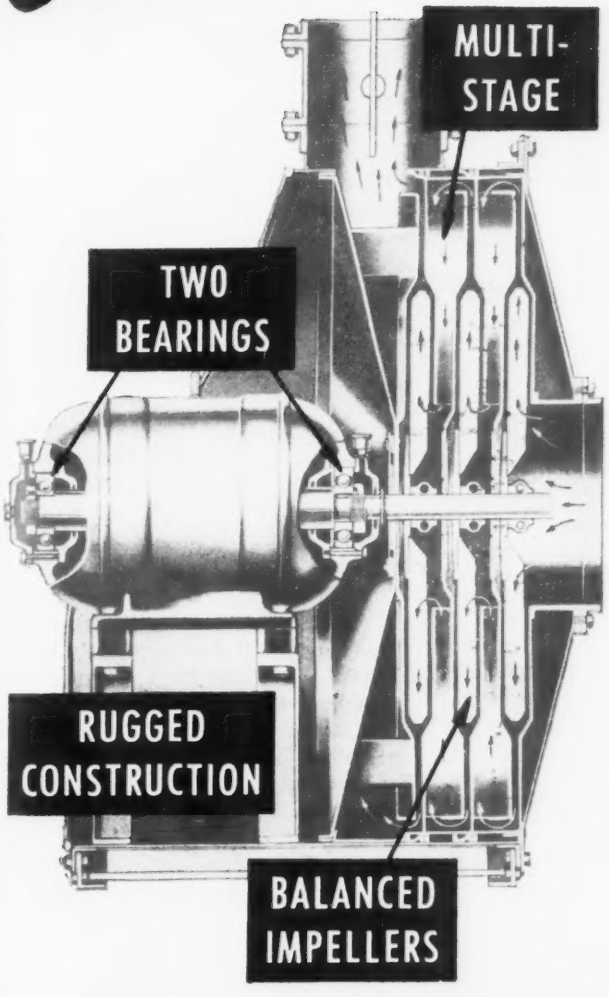
The Plant and Plant Equipment Committee is sponsoring a symposium on coremaking machines.

The Refractories Committee has a number of papers tentatively scheduled, covering a variety of subjects relating to refractory use in the foundry.

CONTINUOUS PRODUCTION

Assured 4 Ways

WITH SPENCER TURBO-COMPRESSORS



There are good reasons why the annual installation of Spencer Turbos has increased tenfold in ten years and why a recent analysis shows that repair parts amount to less than one dollar per machine per year.

No. 1. The Spencer multi-stage construction allows a smaller diameter machine with lower peripheral speeds of the fan blades and of the motor itself. The wear on the bearings is therefore cut to a minimum.

No. 2. The only rotating contacts are at the two ball bearings, which if kept greased will assure satisfactory operation without work stoppages for many years.

No. 3. Here is a machine as simple as an electric fan, with a rugged construction, as sturdy as a steel bridge and with wide clearances between the rotating elements and stationary parts. Users say "the Spencer goes on forever with little attention."

No. 4. Balanced Impellers. Each fan is individually balanced before the machine is assembled. This decreases the vibration, increases the life of the bearings and packing and produces quiet performance.

35 TO 20,000 C.F.M.; 4 OZ. TO 10 LBS.; 1/3 TO 1,000 H.P.

440-H

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

Industry BRIEFS

ALUMINUM Co. of America's Rockdale, Tex., Works began production Nov. 24. When finished, the installation will include a smelting plant with four potlines, in which aluminum will be produced from refined aluminum ore; a plant for the manufacture of carbon electrodes required in the electrolytic aluminum producing process; a power plant for the generation of electricity required, and facilities for mining lignite.

* * *

Mullins Non-Ferrous Castings Corp., 1800 South Eighteenth St., St. Louis, has been bought by Edwin Lopata, 8 Ladue Forest, Ladue, Mo., from Fristoe and Elizabeth M. Mullins. Mr. Lopata purchased the entire 184,150 shares of common stock. Present capitalization of the company is $185,000.

* * *

Buff Equipment Corp., Bronx, N. Y., has been incorporated to handle foundry and factory supplies, capital stock listed at 20 shares, no par value. Directors include: Murray Gordon and Howard W. Gordon, 401 Broadway, New York, and Abraham Reinlieb, 1236 Union St., Brooklyn, N. Y.

* * *

Foxboro Co., Foxboro, Mass., manufacturer of industrial instruments for process measurement and control, has acquired new facilities for the assembly of control valves at 1710 North Akard St., Dallas, Tex.

* * *

Welding Products Division, A. O. Smith Corp., Milwaukee, has become distributor for the line of temperature indicating products manufactured by Tempil Corp., 11 West 25th St., New York 10.

* * *

Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich., has appointed two new distributors of its materials handling products. Towne Industrial Equipment Co., 1410 South Akard St., Dallas, Tex., has been made Clark's authorized dealer in 129 Texas counties, and Hull Equipment Co., Monroe St. and Route 29, Union, N. J., will handle the northern New Jersey territory exclusively.

* * *

Vanadium Corp. of America started production of aluminum alloys at its new, $2½ million plant near Cambridge, O., on Nov. 25. The plant is located on a 120-acre site about 100 miles from Vanadium Corp.'s new $8 million alloy producing plant at Graham, W. Va., where an addition is being made at an estimated cost of $3½ million to permit production of very low carbon ferrochrome.

* * *

Alloys & Products Inc., 1101 Oak Point Ave., New York 59, is now producing and marketing Everdur ingot for the foundry industry under a licensing agreement with American Brass Co. The metal is a silicon bronze said to possess high strength, and corrosion resistance equivalent to that of pure copper.

* * *

Beryllium Corp., Reading, Pa., makers of beryllium copper wrought alloys, has opened a district sales office in the Burke Building, 5 St. Paul St., Rochester, N. Y. The new office will cover western, central and northeastern New York, including Schenectady and Albany. Paul J. Aicher Jr. is in charge.

* * *

Precision Metal Products Corp., Swanton, Vt., recently was organized to produce gray iron and alloy castings. Shop equipment will include electric furnace facilities.

* * *

Allis-Chalmers Mfg. Co., General Machinery Division, Milwaukee 1, has opened an Akron branch of its Cleveland district office. Under the management of Fred C. Timberman, the new office is located in the First National Tower, Akron. Donald W. Ganzhorn, a 1950 electrical engineering graduate of the University of Michigan, has been assigned representative in the Akron office.

* * *

Delta-Star Electric Co., 2437 Fulton St., Chicago 12, operator of Delta-Star Electric Foundry Division, 2701 Fulton St., Chicago, has ceased operations as a separate corporation and will henceforth be known as the Delta-Star Electric Division, H. K. Porter Co. Porter Co. is located at 2437 Oliver Bldg., Pittsburgh.

* * *

Aluminum Import Corp., United States sales distributor for Aluminum Co. of Canada Ltd., has opened a sales office in Los Angeles, at 510 West Sixth St. Roy A. Gentles, formerly of Toronto, Ont., is in charge. Aluminum Co. of Canada is a wholly owned subsidiary of Aluminium Ltd.

* * *

Trundle Engineering Co. and Trundle Associates Inc., Bulkley Bldg., Cleveland, consulting management engineers, are constructing a new headquarters at 2020 Carnegie Ave., Cleveland. The new building will be a two-story structure containing 8000 sq ft of floor space. It is scheduled for completion in February.

* * *

W. C. Dillon & Co., developers and producers of precision test apparatus, have moved their entire operation from 141 South Circle Ave., Forest Park, Ill., to 14620 Keswick St., Van Nuys, Calif., a Los Angeles suburb. The new plant covers 12,000 sq ft on a 2-acre site.

* * *

Wood-Compton Co., formerly J. E. Wood Co., has been formed by J. E. Wood and W. H. Compton, with offices at 25010 Lakeland Blvd., Cleveland 23. Company will represent Warner Electric Brake & Clutch Co., Beloit, Wis., Monitor Controller Division, Ultrasonic Corp., Boston, and Farmers Engineering & Mfg. Co., Pittsburgh.

* * *

American Wheelabrator & Equipment Corp., Mishawaka, Ind., has moved its district office in New York to 53 Newark Street Bldg., Hoboken, N. J., in order to provide better service to users of its products in the portions of Pennsylvania, New York, Connecticut and New Jersey served by that office.

* * *

Cleco Division, Reed Roller Bit Co., Houston, Tex., has appointed Grant & Co., 2144 East Seventh St., Los Angeles; H. N. Crowder Jr. Co., 446 Union St., Allentown, Pa., and Pons-

(*Concluded on page* 182)

MELTRITE PIG IRON

Making MELTRITE
Beginning of a cast of molten iron.

A STANDARD OF *Performance*

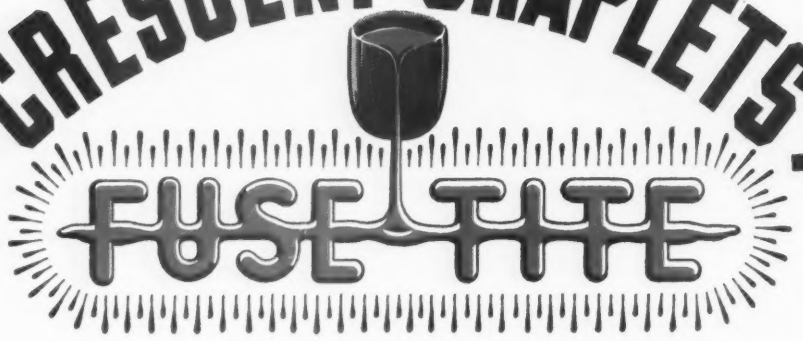
MORE USED THAN ANY OTHER MERCHANT PIG IRON

P M

70 years of service to industry

PICKANDS MATHER & COMPANY
UNION COMMERCE BUILDING • CLEVELAND 14, OHIO
CHICAGO • CINCINNATI • DETROIT • DULUTH • ERIE • GRAND RAPIDS
GREENSBORO • INDIANAPOLIS • MINNEAPOLIS • ST. LOUIS • WASHINGTON
IRON ORE • PIG IRON • COAL • COKE

CRESCENT CHAPLETS



If you don't see it here . . . . ask for it!

We manufacture a complete line of all types and sizes of Foundry Chaplets, and all kinds of wire and metal formations for your foundry use. If we don't already make what YOU need, we'll design and develop just the CHAPLET to suit your requirements. Your inquiries and specifications are invited . . . . for quick service, write for working samples. As a few of our specialties:

- RADIATOR CHAPLETS
- SHOULDER CHAPLETS
- BOILER CHAPLETS
- DOUBLE HEAD CHAPLETS
- MOTOR CHAPLETS
  (Regular or Extended stems)
- TIN TUBES
  (Plain or Perforated)
- FOUNDRY NAILS
  (Plain, Nicked or Barbed)
- SKIM GATES
- CORE WIRES
- CORE PLATES and SHIMS
- TAPER DRIVE PLUGS

CRESCENT FUSETITE CHAPLETS ARE MADE ACCURATE OF PROPER ANALYSIS MATERIALS FOR THE FUSING-IN PROCESS.

Being the Originators and Manufacturers of Radiator, Shoulder, Double Head and Motor Chaplets, Your Foundry benefits by our Chaplet Manufacturing experience since 1889 for the leading Stove, Radiator, Boiler and Motor Foundries.

We carry thousands of different types and sizes in stock for quick delivery, and have the facilities to make up special sizes promptly.

WRITE FOR SAMPLES AND PRICE LIST.

Crescent Brass & Pin Company

5766 TRUMBULL AVE.

DETROIT 8, MICHIGAN

(*Concluded from page* 180)

ford Equipment Co., 408 Bassett Tower, El Paso, Tex., to distribute Cleco and Dallett air tools and accessories in their areas.

* * *

Baker Industrial Truck Co. of Wisconsin, 231 West Wisconsin Ave., Milwaukee, has been appointed exclusive distributor of the complete line of industrial trucks and cranes manufactured by the Baker-Raulang Co., Baker Industrial Truck Division, 1230 West 80th St., Cleveland 2.

* * *

Syntron St. Louis Sales Co., representatives and sales agents for Syntron Co., Homer City, Pa., has opened a new store at 4431 Manchester Ave., St. Louis 10, where Syntron products will be sold and rented.

* * *

Consolidated Feldspar Corp., Trenton, N. J., has sold substantially all its assets to International Minerals & Chemical Corp., Chicago. The corporation will be dissolved and added to International's Industrial Minerals Division.

* * *

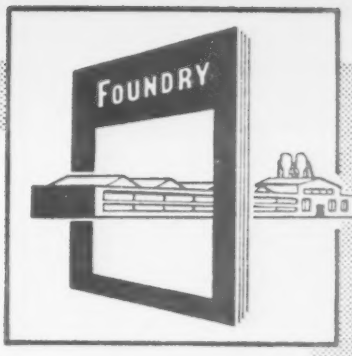
Mond Nickel Co. Ltd., an affiliate of International Nickel Co., New York, has been granted a patent covering the production of ductile iron.

Revision of Industrial Lighting Guide Issued

The American Standards Association has approved "American Standard Practice for Industrial Lighting, A11.1-1952," a revision of the 1942 publication "American Recommended Practice of Industrial Lighting," over 50,000 copies of which were distributed. Emphasizing the bearing of lighting on safety, the new work reflects recent progress in lighting application and the development of new techniques and concepts.

The new edition contains lighting recommendations based on analyses of individual seeing tasks and their environments. It discusses lighting quality and quantity in detail and covers such topics as daylighting, maintenance and supplementary lighting. The section on lighting systems contains photographs of modern lighting in industrial interiors.

Copies are available from the American Standards Association, 70 East 45th St., New York 17, and from the Illuminating Engineering Society, 1860 Broadway, New York 23, for 50 cents each.



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This page has been provided for your convenience. Use one of the return cards below for more information on advertisements in this issue of **FOUNDRY**.

Write the name of the advertiser and the page number of the ad in the spaces provided. Check the type of information you want. After you have finished going through this issue of FOUNDRY and have jotted down all of the ads on which you'd like more information, just tear out the card, drop it in the mail. We'll do the rest.

Our staff will forward this information to the advertiser immediately so you'll be relieved of the necessity of writing several letters. You'll hear from the advertiser directly, answering your request.

FOUNDRY
Readers Service

FIRST CLASS
PERMIT No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio
Readers Service Dept.

Please send further information on the following advertisements in this issue:

PAGE NO.	NAME OF ADVERTISER	Send Technical Data	Send Price Information	Nearest Source of Supply
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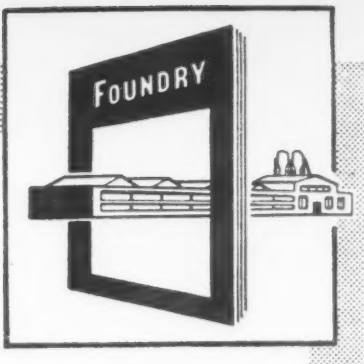
YOUR NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

FDY 1-53



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YOUR NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

FDY 1-53

FIRST CLASS
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FOUNDRY
Readers Service

OBITUARY

CHARLES JARECKI, 83, former vice president of Jarecki Mfg. Co., Erie, Pa., died Oct. 18. Mr. Jarecki had been foundry manager of the company until it was sold three years ago, when he went into retirement. Mr. Jarecki was a charter member of the American Foundrymen's Society when it was organized in Philadelphia and a member of the Northwestern Pennsylvania Chapter of the AFS.

* * *

Rodney C. Rankin, 51, since 1944 chief industrial engineer for the castings division, Aluminum Co. of America, Pittsburgh, died Nov. 11. Mr. Rankin was graduated from Massachusetts Institute of Technology and joined the engineering staff of Alcoa's Cleveland Works in 1927. He was transferred to Pittsburgh 10 years later as assistant to the castings division manager.

* * *

Alfred M. Jones, 64, for many years midwest representative for International Graphite & Electrode Co., St. Mary's, Pa., died Dec. 8. Mr. Jones, a graduate of Yale University, was associated with Federal Malleable Co., Milwaukee, as vice president, prior to joining International Graphite.

* * *

Gustav R. Hinz, 72, founder and president, Midwest Die Casting Co., Milwaukee, died Dec. 6. Mr. Hinz was associated with Stroh Die Casting Co., Milwaukee Die Casting Co., and the Advance Tool & Die Casting Co., Milwaukee, prior to founding his own company in 1927.

* * *

Paul Boland, 36, plant superintendent of the brass foundry, Central Brass & Aluminum Foundry Co., Cincinnati, died Dec. 2. Mr. Boland was the son of Edward M. Boland, president, who founded the company.

* * *

John Bright, 80, former treasurer, Pittsburgh Steel Foundry Corp., Glassport, Pa., died Nov. 3 in Philadelphia. Mr. Bright joined the company as a bookkeeper in 1905.

* * *

George E. Connolly, 55, vice president, Nichols Engineering & Research Corp., New York, died Oct. 17. Mr. Connolly attended University of California and was associated with a San Francisco foundry until 1943, when he joined Nichols Engineering & Research Corp. He had a varied and comprehensive experience in the design, construction and operation of multiple hearth furnaces for use in metallurgy and chemistry, and he obtained patents covering their design and improvements.

* * *

Dr. John L. Bray, 62, since 1923 professor of metallurgy, Purdue University, died Dec. 6. Dr. Bray was graduated from Massachusetts Institute of Technology.

* * *

Joseph W. Early, co-owner and general manager, Early Foundry Co., Dickson City, Pa., died Nov. 16.

New Heat Treating Plant Opens in Los Angeles

Tripling the capacity of its former Los Angeles plant, Lindberg Steel Treating Co. on Nov. 17 opened a new plant with 14,000 sq ft of floor space at 2910 Sunol Drive, Los Angeles. More than 30 furnaces and heat treating units will permit a wide range of specialized work in addition to standard production heat treating jobs. New facilities also include a complete metallurgical and research laboratory.

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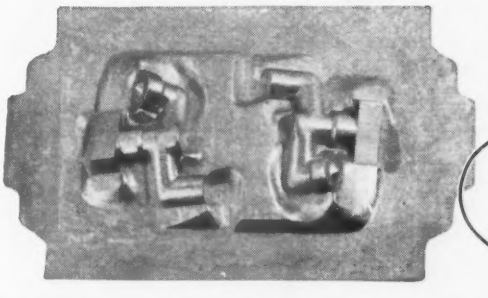

Multiple casting matchplate (left) from pattern (below).

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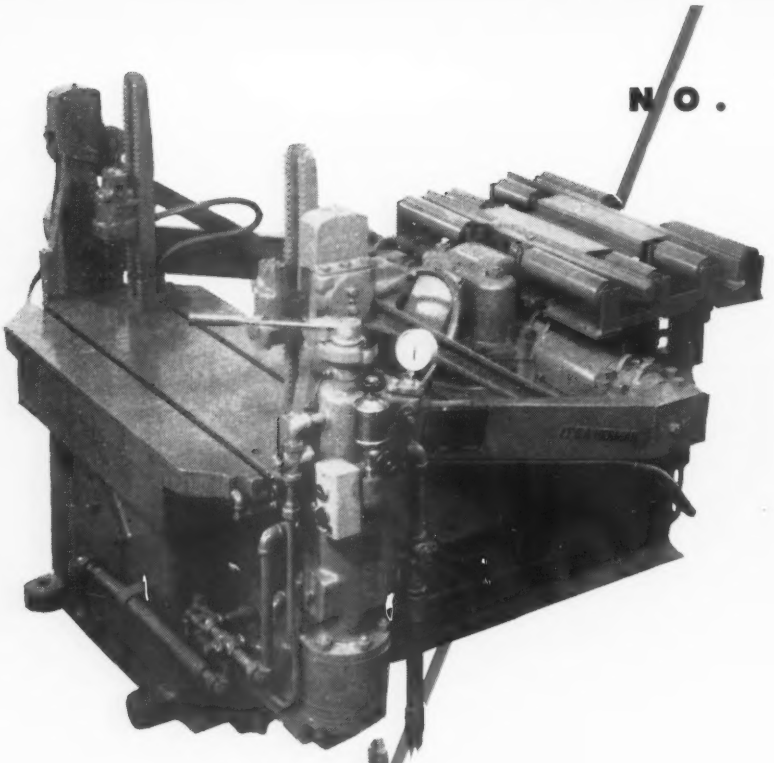

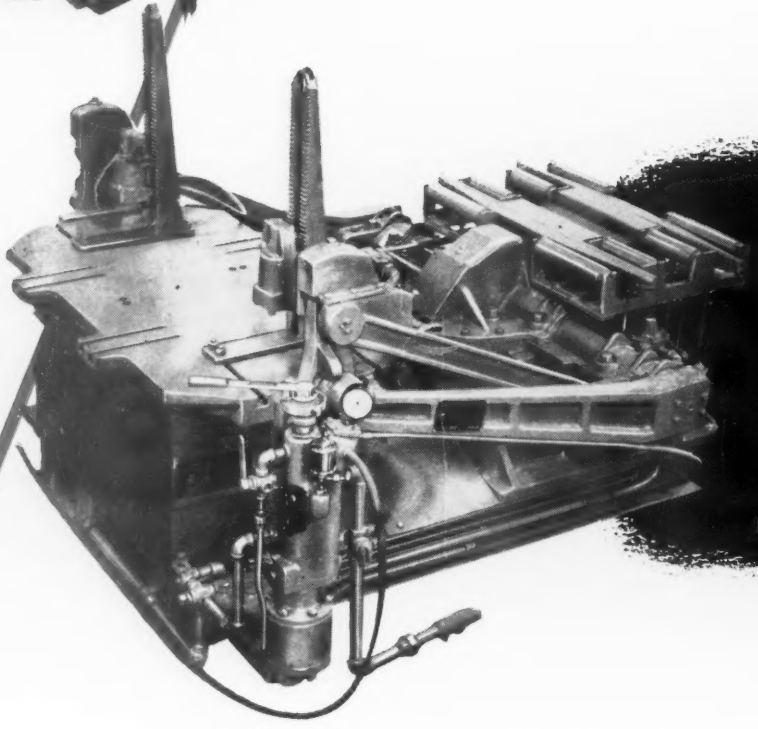

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ANNUAL CHESAPEAKE EDUCATIONAL PROGRAM

Considers Aspects of Cupola Operation

CUPOLA operation was the general topic of the second annual Educational Program of Chesapeake Chapter of the AFS, held Nov. 28-29 at the Engineers Club, Baltimore, in conjunction with the regular monthly meeting. A record 100 foundrymen and guests attended, most of them for all of the two-day program. Lewis H. Gross, American Radiator & Standard Sanitary Corp., Baltimore, chairman of the educational committee led the technical sessions.

Opening technical speaker, after dinner Nov. 28, was W. H. Owen, sales engineer, Harbison-Walker Refractories Co., Pittsburgh, who reviewed a paper, "Basic Refractories for Cupola Practice", written by Max Demler, sales engineer, Harbison-Walker.

Discuss Basic Practices

The meeting was conducted as a panel forum for discussion of basic practices. Starting with a discussion of basic refractories, the following points were explained:

1. Expansion properties of basic refractories compared with those of acid refractories.
2. Thermal conductivity of both types of refractories.
3. Other physical properties of various basic refractories.
4. Types of shapes available.
5. Comparison of melting ranges of acid and basic slags; greater viscosity or stiffness of basic slags.
6. Lesser protection given to molten metal by basic slag and the need for more exact cupola operation to prevent oxidation of the melt.
7. Limestone charge around inside periphery of cupola walls with basic refractory.

It was brought out that most erosive damage to cupola linings occurs during the first hour of operation, before the refractory wall has acquired a glazed coating.

Since basic lining is more expensive than acid, the choice of which type of cupola to use depends upon two factors: Whether specifications for the chemical and physical properties of a casting are so exacting that they cannot be met in an acid cupola. 2. Whether the cost or the availability of raw materials justifies the extra cost. Basic cupola operation greatly simplifies the melting of the metal for nodular iron, for example.

The showing of two movies, "Preparing a Cupola for Charging" and "Charging and Operating a Cupola," began the Saturday sessions. Although they were somewhat elementary in nature, they enabled speakers to bypass fundamentals and go directly to a more advanced consideration of cupola practices. Philip Newhart, foundry superintendent, Koppers Co., Metal Products Division, Baltimore, was film discusison leader.

First speaker was H. W. Lownie Jr., assistant supervisor, Battelle Memorial Institute, Columbus, O., who spoke on "Cupola Fuels." He explained why such solid fuels as oven coke, beehive coke and anthracite coal are most frequently used in cupolas and why oven coke is often in short supply. The maximum recovery of chemicals from coke is attained in about 16 hours, but good grade oven coke requires at least 32 hours coking time. Oven coke therefore is more expensive to make and cuts down on coke production.

Coke strength, Mr. Lownie said, bears an important relationship to screen size. Roughly speaking, coke for any given cupola should be as many inches in diameter as the diameter of the cupola in feet. For best results, for example, a cupola lined to 60-in. ID should not use coke over 5 in. in diameter.

Mr. Lownie suggested that purchasers submit coke specifications when they place orders. In addition, foundrymen should improve their coke handling, for most coke damage occurs during unloading. Blast drying and blast preheating equipment will help temperature and carbon pickup. Preheating to 1000° F has produced excellent results, and temperatures of 1600° F are now being tried. Hot blasts, he said, give higher dollar return than almost any other auxiliary equipment used with cupolas. Foundrymen should compare the cost of buying better coke to that of installing a hot blast system.

Mr. Lownie also described a new fuel for cupolas being manufactured by National Fuels Corp. Fine anthracite coal is briquetted or extruded to desired shape and size and then retorted to produce the desired hardness. This product is said to be physically and chemically uniform. Anthracite coal fines left at the colliery after washing are available in large quantities and are the chief constituent of the new fuel.

Tom E. Barlow, sales manager, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago, gave the concluding talk of the session, "Acid Cupola Operation and Refractories."

He explained the effect of early lining burnout on coke bed height and warned that if air density is not changed as lining burnout occurs, temperature and carbon and silicon content suffer. Ideally, rate of blast should be changed gradually and coke and charge size increased simultaneously to maintain constant production while the inside diameter of a cupola changes.

Some operators who start out operating a 48-in. cupola end up with a 60-in. cupola, Mr. Barlow said. Most of them will admit that the operation of a 48-in. cupola is different from that of a 60-in cupola, yet such changes occur without corrective measures being taken.

Avoid Thick Patches

Continuing, the speaker pointed out the fallacy of putting the thickest lining at the point of greatest burnout. Such practice ignores the thermal conductivity of the refractory and the difficulty of obtaining a solid patch. A better course is to follow contour lining, putting in a minimum amount of refractory, a layer of equal thickness over the burnout so that future rate of burnout will be uniform. After the first burnout following relining, inside diameter measurements should be checked and used as a guide to subsequent relining.

Mr. Barlow went on to describe recent developments in cupola refractory linings. He said that many different materials had been tried and that the most expensive were not always the best. The refractoriness of a material is not always the answer to less burnout, for chemical reactions involved usually govern burnout extent and conditions. There is always a chemical reaction between refractory and material charged.

Discussing patching, the speaker warned that hand daubing or patching lacks uniformity and requires high moisture content. Gun lining, on the other hand, requires lower moisture content, permits higher patch density and eliminates the weaknesses of hand daubing. Summing up his talk, Mr. Barlow emphasized the importance of the "diameter factor" in uniform cupola operation and the reduction of economy and efficiency in operation that takes place when a cupola is run slowly.

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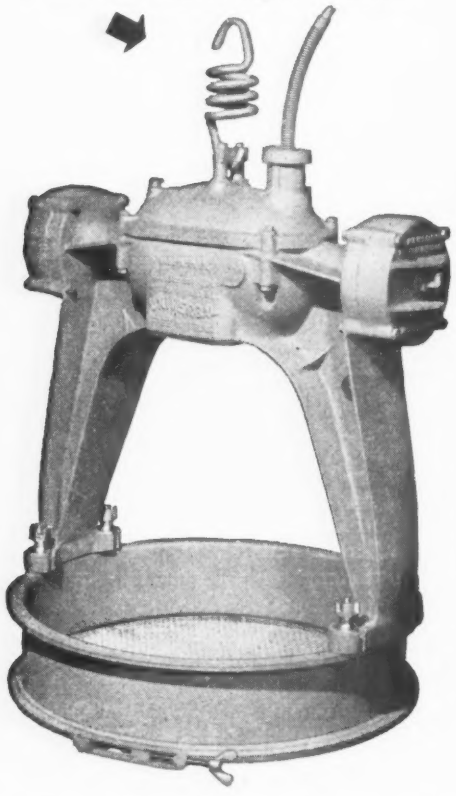

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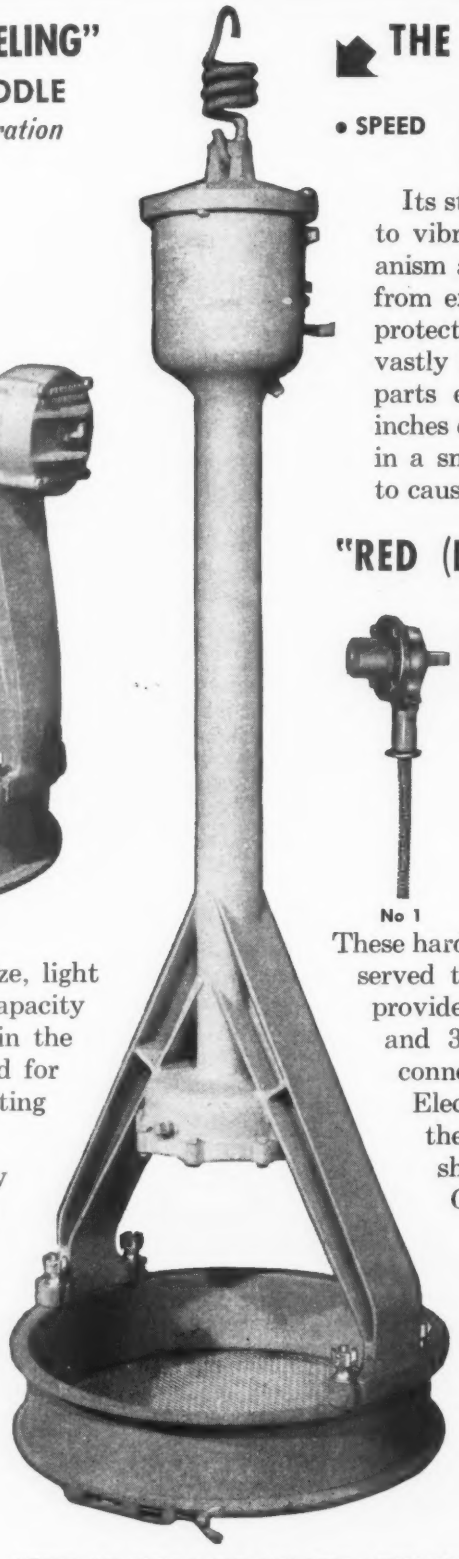

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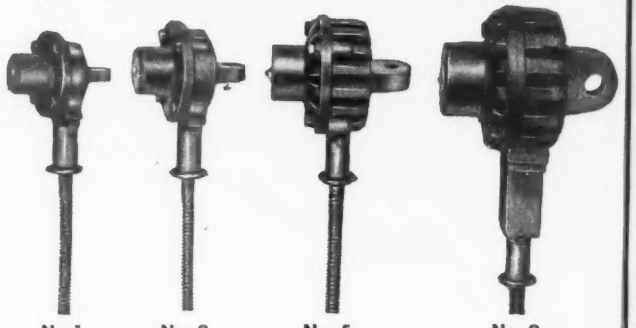

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PATTERNS—Their Relation To Castings Production

Part III

ABC of Foundry Practice

By T. H. TREVITHICK

THE need for a special casting or castings in manufacturing plants often arises in such a fashion that time of production becomes a vital factor. Such a situation may be caused by a breakdown, a need to replace worn equipment or by the sudden discovery of a department that a special part is needed in a great hurry. This kind of occasion gives a patternmaker the opportunity to display resourcefulness, not only by producing an inexpensive pattern, but by producing it in the shortest possible time. Obviously, the pattern must be constructed in such a manner as to facilitate work in the foundry.

The patternmaker may have to work from a rough sketch, or in many instances a broken or discarded casting may be his only available guide. While the patternmaker and molder, singly or in combination, frequently hit upon an original and ingenious scheme for making a casting, their decision is based on a general knowledge of established and, therefore, fairly well known methods.

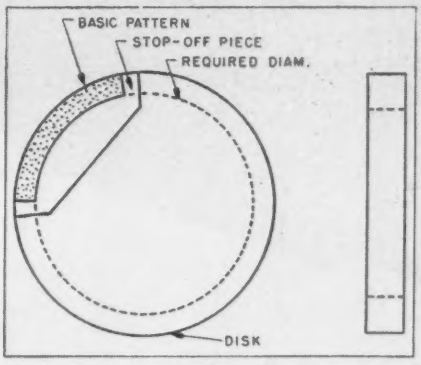
A stop-off piece of wood, cut to any convenient thickness and conforming to the outward shape of the mold, is placed in the mold at any given line or measured distance from the end or side. Sand is packed against the stop-off piece to form a new or shorter boundary of the length, width or diameter of the mold cavity. In this way a standard dimension pattern may be used to mold smaller castings of the same general design. With a slightly different technique, a short pattern can be manipulated to make a longer casting.

Frames and templets are used in some instances to avoid the expense of making a full pattern. The method is particularly adaptable to plates of any shape or size. Overall size and thickness are established by the dimensions of the wood frame. The mold can be made either in a flask or in the foundry floor. In a preferred method, a sand bed is prepared, flat and level. The frame is laid on the bed, and sand is rammed outside and scraped off flush to form a seat for the cope. The inside is filled with loose boards the same thickness as the frame. The cope is rammed and lifted off, and frame and boards are removed from the mold. In a second method, the frame is leveled, and sand is rammed on the inside and outside, then scraped off flush with the top of the frame. After the cope has been rammed and removed, a wood scraper or strickle is employed to remove a thickness of sand from the inside of the frame.

In addition to serving as a guide in setting various cores in a mold, templets are employed to mark off the interior of molds where a portion of sand is to be removed or to establish a guide line or lines.

In many instances it is more practical to *bed in* a pattern than to ram it up in a flask and roll the flask over. This applies particularly to plates, beds, frames and other patterns in the same general classification. The large surface area and the comparatively shallow thickness of these patterns make the process attractive. In many cases the size and weight of the mold and flask would be prohibitive.

With two parallel straight edges sunk in the floor the desired distance apart, a third straightedge is seesawed back and forth to form a level sand bed. The pattern, or frame, is placed on the bed. Where projecting members are present, sand is scooped out. The pattern is rapped down, sand is rammed around the outside edge, surplus sand is scraped off flush with the top surface of the pattern, and the cope then is rammed and lifted off. When the pattern is removed, the mold is ready to be closed and filled with metal. In some instances large, flat cores take the place of a cope made in a flask. Many castings in which a smooth, perfectly clean upper surface is not a factor of importance are made in molds without a cover. Among foundrymen they are known as open sand castings.



Stop-off piece of wood is used to alter a standard dimension pattern for producing smaller castings

Extra large castings are molded in pits in the foundry floor. Several molders may work for a week or more on one of these jobs. After the mold is complete, it is covered with loose metal sheets, or in some instances by the cope, and dried with stoves on the inside. In another method a stove is mounted on top of the mold, and air from a small blower is driven through the stove and into the mold.

Patterns for pit molding usually are made in sections or in several separate parts so that each loose piece can be drawn back into the interior of the mold. The pieces are drawn horizontally and in many instances present a ticklish problem. Loose pieces usually are attached to the main pattern by dowel pins. When cores are set in one of these large molds, the presence of the patternmaker who made the pattern is desirable. In this instance, his layout serves a purpose other than as an aid in constructing the pattern.

The patternmaker makes a layout or working drawing before starting to build a pattern for many reasons. Metal shrinkage must be taken into account. Clearance for core prints must be provided. Machine finish is added where necessary. Core prints are shown. Pattern construction and joinery details are included.

Full-size layout is very helpful to the patternmaker. As the work progresses, he can lay the pattern on the layout table—mark off the required centers and square up the work at different stages of construction. Here also occasional errors may be found in the original drawing and corrected before proceeding. Because the layouts are made full size, the true proportions of the finished job become evident. Sections of castings that are uneven assume their true significance, whereas that prob-

(*Continued on page* 194)

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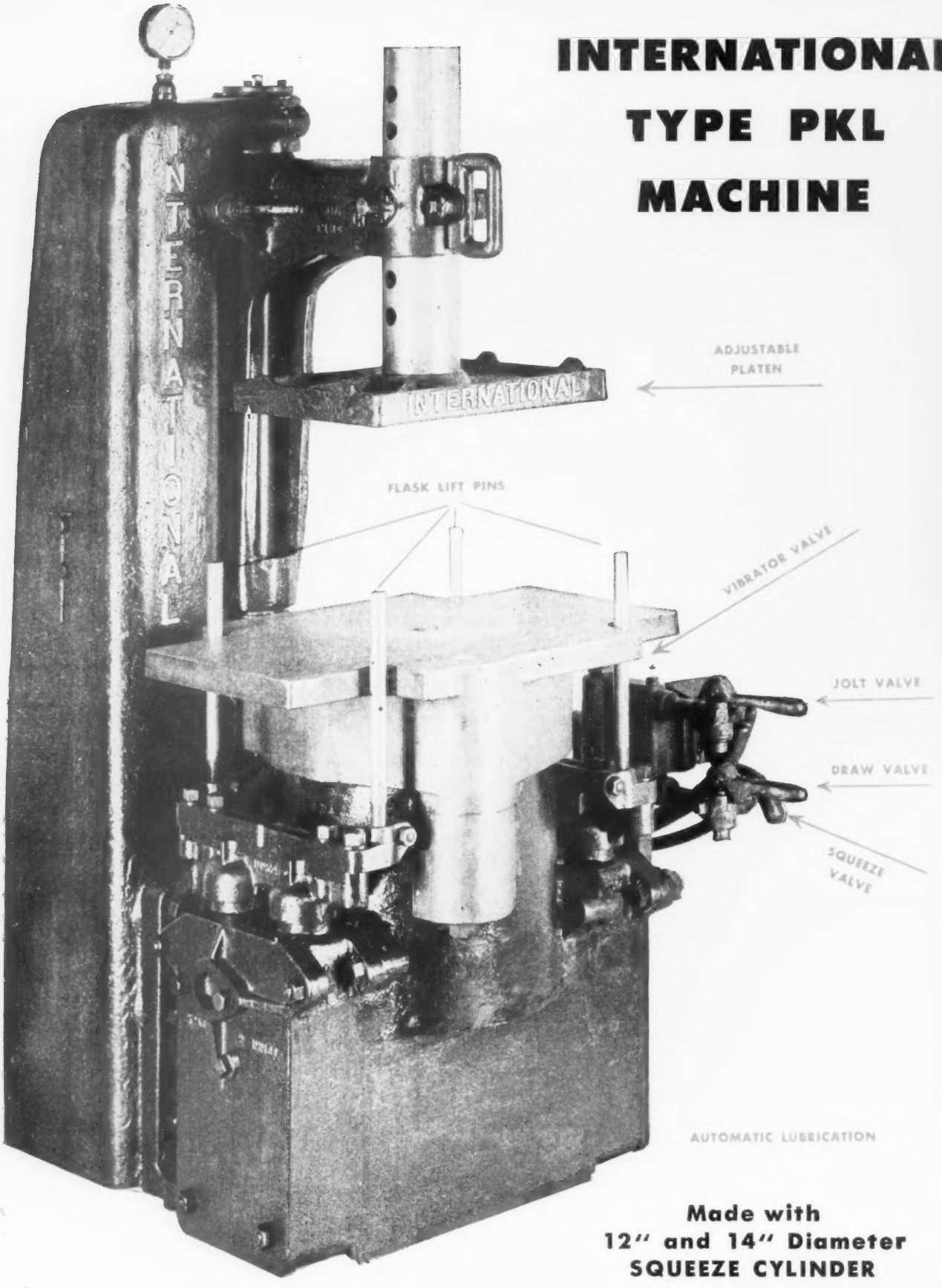

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LDG MACHINE COMPANY

GE K, ILLINOIS

(*Continued from page* 191)

lem might be overlooked in a small-scale drawing. A large amount of casting trouble is directly traceable to uneven sections.

Invariably where thick and thin casting sections are joined, a shrink hole will develop in the thick section. Even if a crack cannot be seen in the adjoining thin section, a strain is almost sure to develop and to cause a defective casting. It is practically impossible to produce a grade of iron containing satisfactory properties for thin and thick sections in the same casting. A spongy area or shrinkage cavity appears in the heavy section unless extreme precautions are taken with chills and heavy risers. Machinability may prohibit chilling, and the thick section may not be accessible to a riser. When a heavy mass of metal is inevitable, it should be where sponginess will do no harm, or it should be accessible to a riser or a shrink head.

Dry Sand Molding—Dry sand molding generally is considered slower and more expensive than green sand molding. To a certain extent it is both. Since the type of casting usually decides the molding method, the cost factor is relatively unimportant. It would be impossible to produce certain castings in green sand molds. The dry sand mold removes most of the hazard inherent in the green sand mold. The added cost may be regarded as the premium paid on a policy that guarantees a perfect casting.

The term "dry sand" is rather indefinite and is based principally on the fact that metal is poured into green sand molds immediately or soon after they are made. Dry sand molds are baked to expel all moisture. The practice involves oven installation and operation and a lag in the production schedule. A considerable difference exists between the sand in green sand and dry sand molds. Dry sand resists weight and pressure better because it is coarser, harder, firmer and more durable. This property is one of the main reasons why larger castings are made in dry sand molds. Several other reasons might be cited for the use of dry sand molds. Often a dried mold is imperative for the production of a sound, clean casting. Making comparatively small castings in dry sand molds instead of in green sand often can reduce the lost casting percentage.

Properly prepared dry sand molds permit greater firmness than possibly could be expected of green sand molds. Rigid walls resist pressure and maintain shape of the casting in a deep mold, the face of a dry sand mold imparts a smooth, even skin to the casting, and the moisture-free mold is more permeable. Venting problems are almost nonexistent except in pockets and confined spaces, and there is less danger of scabbing.

A scab is an unsightly lump on the face of the casting caused by a breakdown on the mold casting—usually in a vital spot. A scab on the face of a casting means a dirty spot in some other area.

Another advantage of a dry sand mold is that the metal can be poured at a higher temperature than usual if necessary. Metal loses temperature more rapidly in a green sand mold than in a dry sand mold. Therefore, there is the danger of formation of cold shuts and misruns. It is fairly well recognized that the soundest and best castings are produced with the hottest possible iron.

Refractory Facing Sand

It may be timely here to mention that the characteristics of sand in all molds have a direct and important bearing on the appearance of a casting. This is particularly true of the layer of facing sand which comes into direct contact with the face of the casting. The sand should be sufficiently refractory to resist the heat of the metal. Less refractory sand will fuse to the face. Good molding sand should carry a high percentage of silica, a species of quartz which is the most refractory of any rock or sand.

Mechanical equipment is almost universally employed to prepare the various sand mixtures employed in foundries. Careful check is kept on the amount of bond, moisture content, green and dry strength and permeability. Core sand mixtures are based on silica sand from the sea shore, from natural deposits on the land or from crushed silica rock. Various amounts of molding sand are added, depending on the purpose the core is to serve. The mixture is bonded with flour, molasses, glue, oil, resin, pitch, or any other one of several proprietary compounds supplied by firms which cater to the foundry industry.

Routine construction of a pattern is the same whether the mold is to be made in green or dry sand. Since the majority of dry sand molds are for large castings, however, the pattern equipment usually is in sections, in skeleton form, or in the form of a number of sweeps to be used in connection with a spindle set up vertically in a socket. The socket may be in the bottom of a pit in the foundry floor, it may be at the floor

(*Concluded on page* 196)

SEAMAN MEDAL CONFERRED: Marking the first presentation of the award to a European, United States Ambassador James Clement Dunn, right, presented the Joseph S. Seaman Medal of the AFS to French metallurgist Prof. Albert Portevin, left, "for technical contributions over many years to the arts and sciences of the foundry industry" at the American Embassy in Paris, Oct. 23. Prof. Portevin's long, impressive scientific career includes service as the director of the Ecole Superieure de Fonderie, Paris, where he still holds the chair of metallurgy, and as honorary president of the Association Technique de Fonderie de France. Prof. Portevin was unable to attend the International Foundry Congress at Atlantic City, May 1-7, to receive the award in person at that time

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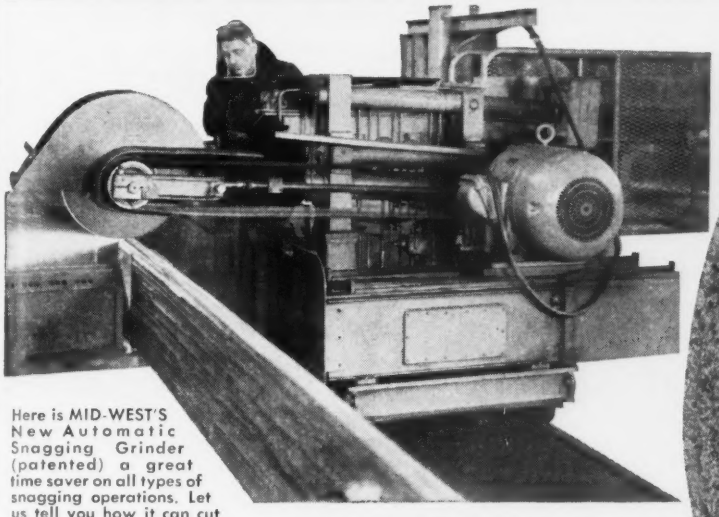

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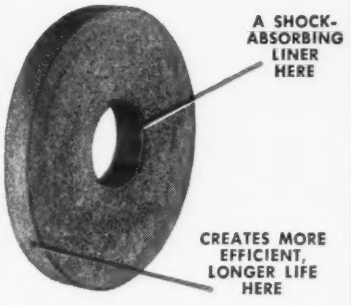

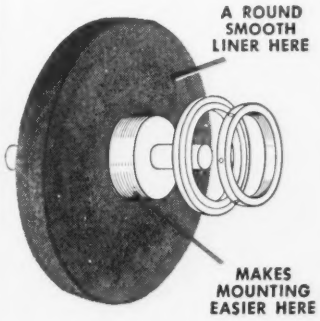

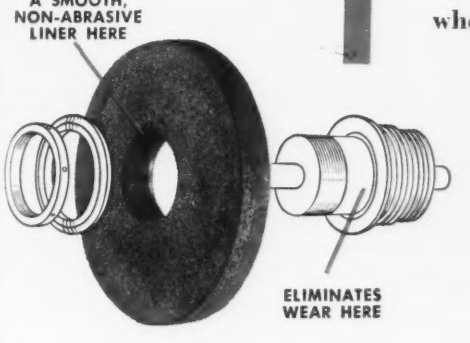

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- **easier on your work piece.**

Not only will Mid-West Fiber-Cushioned resinoid snagging wheels minimize the troubles so characteristic of snagging operations, but they're easier to mount, they're stronger, and they last longer.

The fiber-cushioned centers plus Mid-West's special resinoid bond, an extremely cool cutting bond, assures a highly satisfactory wheel life and increased production.

For complete information on these Fiber-Cushioned snagging wheels, write, wire or phone today.

MID-WEST ABRASIVES

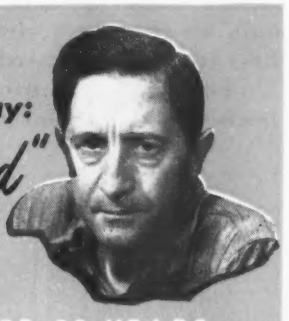
Executive Offices: 510 South Washington Street, Owosso, Michigan
Plants in Owosso, Michigan and Rochester, Pennsylvania

CERTIFIED ABRASIVES

CLEAN and CLEAN and CLEAN and CLEAN!

"Certified" Samson Shot and Angular Grit wear longer, clean better! That's because they're made *extra-tough* by a special *automatically controlled* hardening process that assures you fast, efficient, high-quality blast cleaning over and over again. Try "Certified" in *your* cleaning room and you will discover why it is the *first choice* in hundreds of foundries.

All sizes graded to SAE specifications.



Experienced Foundrymen say:

"Always specify Certified"

ACCEPTED AND USED FOR OVER 55 YEARS

PITTSBURGH CRUSHED STEEL CO.
Pittsburgh, Pa.

MEMBER FEMA

STEEL SHOT AND GRIT CO.
Boston, Mass.

(*Concluded from page* 194)

level, or it may be attached to the bottom plate of a flask. Location depends on local conditions.

Dry sand molding is practiced more extensively in steel foundries than in iron foundries. As stated elsewhere, the dried mold is more resistant to heat and pressure. Also, it lends itself more readily to elimination of the hazards connected with gating and venting.

In recent years practically all small steel castings and many heavier castings, including side frames, bolsters, axle boxes and other parts for railroad cars, have been made in green sand molds. A knowledge of sand characteristics is more widespread among foundrymen, and control instruments are available for keeping close check on sand properties. Chills are employed extensively to obviate the necessity to provide bulky shrink heads. Eliminating the shrink heads reduces both the amount of metal melted for a given casting tonnage and the cost in the casting cleaning department. Other methods and materials, including atmospheric pressure, insulating sleeves and heat producing compounds, have been introduced recently to increase shrink head efficiency and reduce bulk.

Although molten metal does not sink into the sand after the manner of water or other liquid, with resulting scouring action, still, under certain conditions it has an erosive effect. The metal may eat away fillets, partitions or projections, or wash away sand from other areas, particularly in the vicinity of the gates, where it travels with highest velocity. A casting with unsightly excrescences may be a partial or total loss. The washed sand, with the perversity of inanimate objects, will come to rest almost invariably in a part of a casting where it cannot be tolerated.

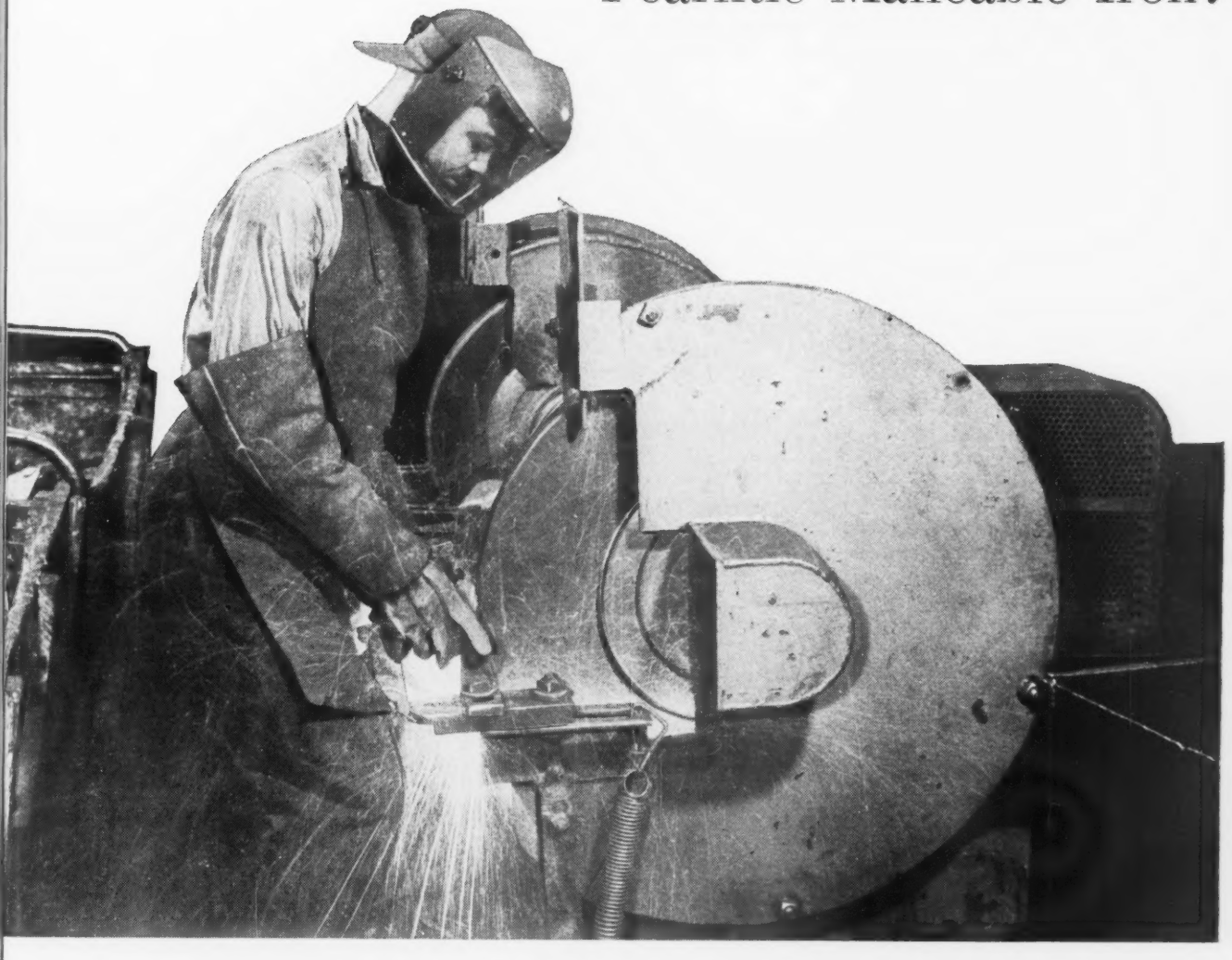
Whenever they can, then, the designer and the patternmaker should avoid sharp fillets and thin bodies of sand projecting above the surface. This policy is preferable with either dry or green sand, but to a greater degree with green sand.

(*To be continued next month*)

Show Steel Film Abroad

Mutual Security Agency has ordered prints of "Steel with a Thousand Qualities" a motion picture made by Lebanon Steel Foundry, Lebanon, Pa., for showing abroad to MSA nations. The color film, which has a running time of about 37 minutes, depicts methods used by modern American foundries casting metals for products ranging from valve casings to jet engine parts.

Why are U. S. Rubber grinding wheels chosen to grind Pearlitic Malleable Iron?



To grind gates from castings of Pearlitic Malleable Iron, the grinding must be done very quickly, at great pressures, so that there is no time for excessive heat to build up. Not only must the wheel cut rapidly and cool but also it should be wear resistant to provide economy. Special tailor-made wheels by United States Rubber Company are the only wheels which this foundry has found suitable for the job.

This is another example of why it can pay you to consult a "U. S." technician about your grinding wheels requirements. Invariably he can help you increase production *and* reduce costs. Write address below.

GRINDING WHEEL INSTITUTE MEMBER

PRODUCTS OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Adventures of BILL

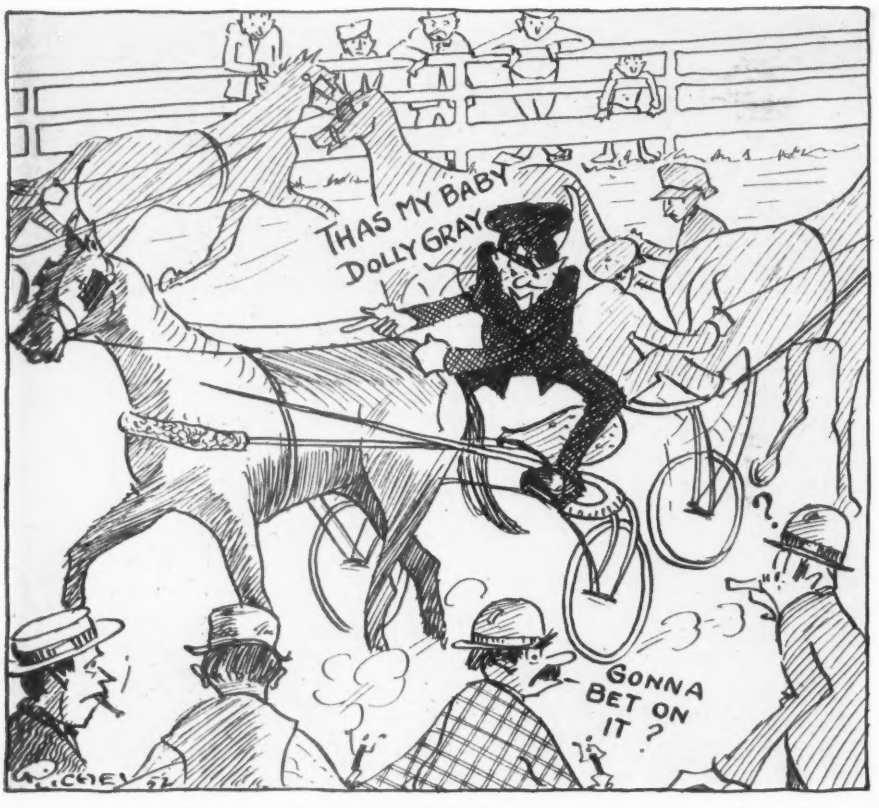
By PAT DWYER

Illustrations by RICHEY

MANY years ago, at a time of life when I found the days altogether too short for my many activities, I spent several hours one night each week exercising to the full all my rights and privileges as a duly qualified and elected member of a debating club. We did not discuss any revolutionary or abstruse problems, but confined our efforts and oratory to the regular old standby—hardy perennials, you might say—favored by standard debaters the world over.

This form of indoor sport languished and died each year when the first warm zephyrs of spring came stealing over the great outdoors, when the wild geese went winging north and the pussy willows began to show a tinge of green along the brooks. However, it always sprang up again with the first nippy nights in the fall when the same V-shaped squadrons that drifted northward a few months before, passed high overhead on their way south to the delta of the Mississippi and the feeding grounds that extend along the shores of the Gulf of Mexico from Florida to Yucatan.

You know those kind of nights where the rush of hot air is grateful and comforting as you open the door and smell of blistering paint on the old round, pot bellied stove feels good in the nostrils. On nights like these we spilled floods of oratory, deciding whether the sailor endured more hardship than the soldier in the pursuit of his calling, and whether country life was preferable to life in the city. At that time we lived in a little town of about 5000 and naturally felt competent to discuss the advantages enjoyed by those fortunate enough to live in those places designated in the census returns as large centers of population. Other subjects receiving a fair share of our attention included the problem whether the reader or the traveler had the better chance of acquiring an education; whether the mariner's compass or the printing press had conferred the greater benefit on humanity; whether a shoemaker was more necessary to a community than a tailor and finally, whether a sheep was of more direct value to a farmer than a grindstone.



On the applause meter he leads Casey Jones and Casey at the Bat

At present I cannot recall that we ever definitely settled any of these momentous questions. Heaven knows we upheld our respective contentions with all the vigor and enthusiasm and, if the truth must be told, with all the bull-headed innocence and ignorance of youth. The fact that we were as ready and willing to talk on one side of the argument as the other may have had something to do with keeping the various questions alive.

Shortly after I finished serving my time in the foundry I flew away from the old home town under just as irresistible impulse as that which drives the wild geese north and south with the changing seasons. Naturally I lost touch with the old debating club. I never have joined one since and practically had forgotten that such things existed until I received a letter a few days ago from a young man who wrote that he expected to uphold the negative side of a resolution to the effect that the agricultural industry was of greater importance than the iron industry. He lived in an agricultural community and would have felt more at home in supporting the resolution, but to develop any interest in the debate it was essential that some one should speak on the negative side, and he had been selected or appointed for the purpose. He might have refused, but, well, you know how it is.

He admitted he did not know whether iron was quarried out of the ground like stone and then cut into the various forms in which we see it, or if it first was softened in some manner and then pressed into shape. He would appreciate information on that point and, in fact, on any point on which I might care to enlighten him. If I should look upon the idea favorably he would suggest that I divide the topic into three parts—historical, development, and manufacturing processes. He thought the subject could be covered in about 3000 words. If I kindly would mail him, say, ten typewritten pages, double spaced for convenience in reading, he figured he would be able to knock 'em all dead on the night of the great agricultural-iron debate.

My first impression was that the young man might be lacking in knowledge connected with the iron industry, although I only had his word for it. He certainly was not lacking in self assurance. In addi-

(*Continued on page* 200)

CONTROL THE BLAST AND IMPROVE OPERATION

A new Whiting 8-page report, "Cupola Blast Control," describes the latest methods for maintaining quality and economy in cupola melting. It contains all the important data for air blast control and humidity compensation which were prepared after considerable research by the Battelle Memorial Institute, including charts for rapidly determining the relationship between humidity, blast rate and coke weight.

The report also contains illustrations of equipment being used to control the volume of air by weight and the moisture content automatically.

Be sure to obtain your free copy of this interesting and informative paper. Write today, asking for Bulletin FO-7.

WHITING CORPORATION

15607 Lathrop Ave., Harvey, Illinois

Manufacturers of a Complete Line of Foundry Equipment

Write for These Other Whiting Bulletins:

"How To Make Your Cupola Operation More Efficient", FO-1
"Tips On Improving Cupola Charging", FO-2
"Hot Blast", FO-3
"Facts On Duplexing", FO-4
"Here's How To Save Melting Fuel", FO-5
"The Electric Furnace In The Iron Foundry", FO-6

WHITING

FOUNDRY EQUIPMENT

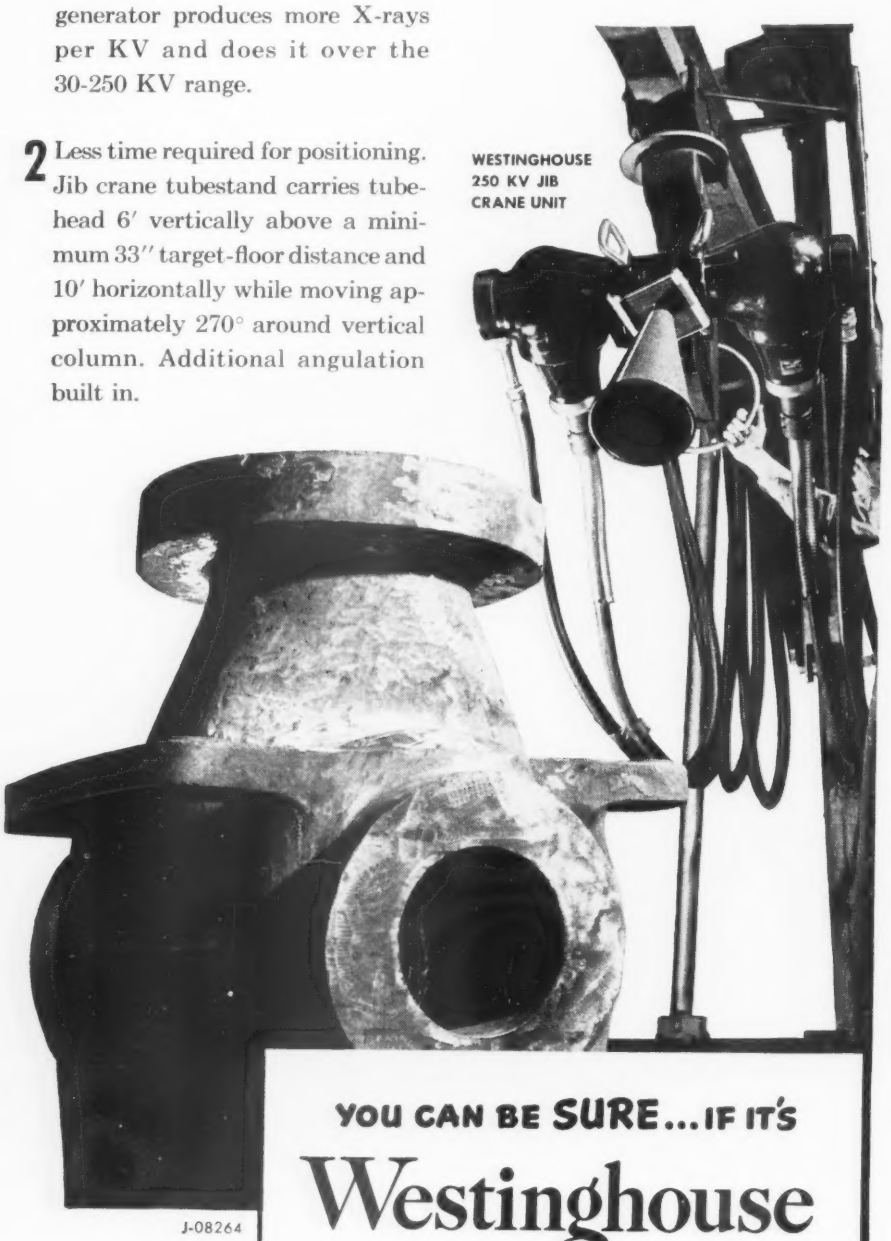
TOUGH JOBS *made easy*

At American Steel Foundries' plant in Newark, New Jersey, inspection of heavy steel castings is made easy by Westinghouse Industrial X-ray equipment. Reason: extreme *flexibility*.

1 Thick *or* thin materials take less time to radiograph. Westinghouse *Constant Potential* high voltage generator produces more X-rays per KV and does it over the 30-250 KV range.

2 Less time required for positioning. Jib crane tubestand carries tubehead 6′ vertically above a minimum 33″ target-floor distance and 10′ horizontally while moving approximately 270° around vertical column. Additional angulation built in.

Westinghouse assures you the finest, most flexible X-ray tools for your inspection jobs *plus* a coast-to-coast staff of technical experts. Call your Westinghouse X-ray representative or write Westinghouse Electric Corporation, 2519 Wilkens Avenue, Baltimore 3, Maryland.



WESTINGHOUSE 250 KV JIB CRANE UNIT

J-08264

YOU CAN BE SURE...IF IT'S

Westinghouse

(*Continued from page* 198)

tion, he seemed to have a fair working knowledge of the game usually associated in the public mind with those who make the greater part, or all of their living by their wits—passing the buck. First impressions are not always reliable. To give my unknown correspondent the benefit of any reasonable doubt I consulted Bill before taking any action.

"That bird," Bill said, "never did a hands turn in his life if he could get some person to do it for him. I have worked for men like him, short engagements of course, but long enough to size 'em up. Tell this lad you fully appreciate the implied compliment, but that really it is his debate. A natural shyness and reserve prevent you from presenting your views even by proxy before strangers. Tell him to look in the GREITA volume of the encyclopedia and he will learn enough about iron to carry him through several debates. Personally, I think you should treat him rough. You may handle him with gloves if you like. If I had my way I should handle these birds who pinch other men's ideas and pass them off as their own, with a pair of tongs—hot tongs. In contrast to the foregoing, let me read you a bit of correspondence I had recently on certain activities of two old-time foundrymen who did their own thinking and stood on their own competent feet."

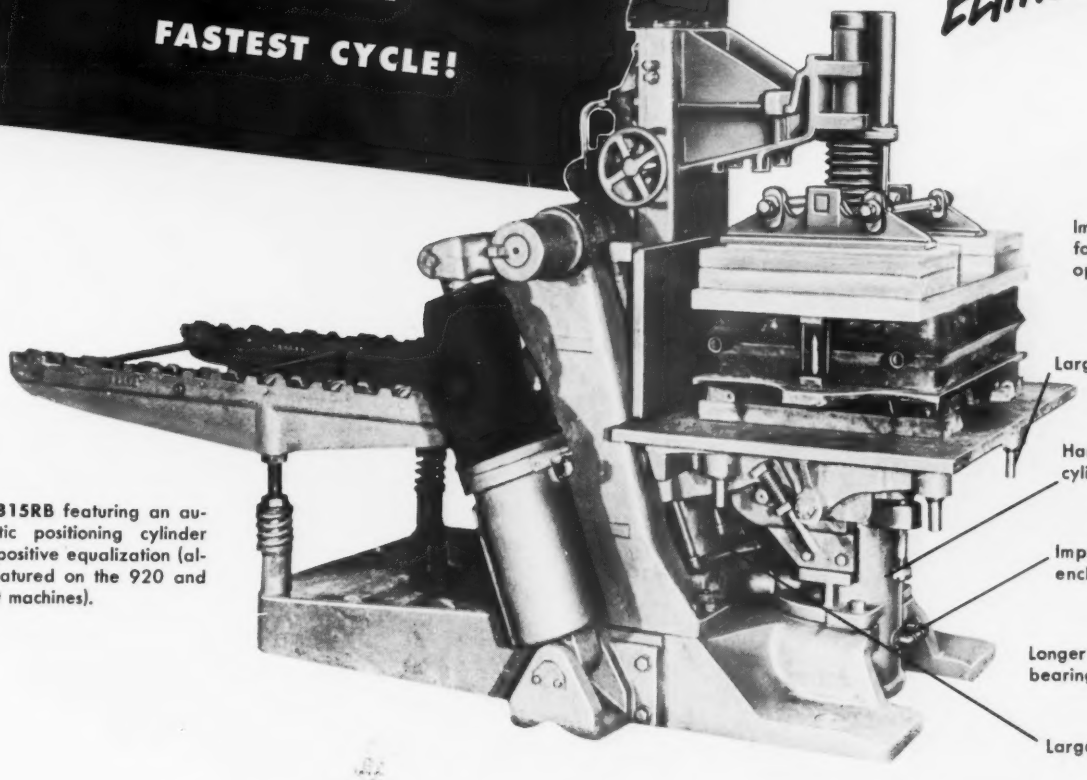
Dear Bill: Off and on, as the fella sez, I been reading your stuff in FOUNDRY since about the year of the big wind. How long you been spinning the yarn before that time I don't know. It seems to me from some of the places and people you mention, you could give Methusalem and some of the other Old Testament birds quite a run for first place in the all-time endurance race from the starting barrier to the final mile post. Long ago I give up wondering how you do it. Makes me think of a remark I heard one day at the old trotting park out near Hogan's brickyard. Sam Buckley from Bangor was in the sulky behind his little pacing mare Dolly Gray. The proud owner and driver of the 2.30 winner shouted for one and all to hear, "Ain't she the beauty? Out in front all the way and nev-ah tu'ned a hai-ah!"

Well, Bill, what I'm getting at is this. Long before my hair began to turn, or perhaps more properly speaking, long before it began to steal away and disappear, my podner on the next floor—perhaps you know him, Jerry the Pug, or just Pug for short—well, anyway, he told me that his son, rooting around in the public library had come across a book on foundry practice. One chapter was all about how to melt a few hundred

(*Continued on page* 203)

this JOLT ROLLOVER MACHINE HAS THE FASTEST CYCLE!

TWO TIME-CONSUMING OPERATIONS ELIMINATED!



The **815RB** featuring an automatic positioning cylinder and positive equalization (also featured on the 920 and 1020 machines).

- Improved valve manifold design—faster operation.
- Larger, longer guide pins
- Hardened and ground jolt cylinder guides
- Improved jolt control—enclosed internal porting
- Longer jolt cylinder—30% more bearing area
- Larger rollover piston rods

Why the fastest cycle? Because in the Johnston & Jennings rollover cycle, two time-consuming operations have been eliminated. After rollover, it is unnecessary to raise a separate draw cylinder and equalize. Also eliminated is the unclamping operation necessary in the standard rollover cycle. Clamping and equalizing operations are combined in the downward stroke of a single double-action clamp and draw cylinder. Then, after rollover, this same cylinder draws the mold on its reverse stroke. No transfer of the mold load—no clamping and unclamping necessary. No pits are required for the installation of these machines. Today's rapidly changing production picture may necessitate changes in your foundry layout at any time . . . and a pit can't be moved. Use a Johnston & Jennings jolt-rollover-draw for your toughest production molding job, or use it as a rollover-draw machine in conjunction with a Sandslinger or Speedslinger. It pays to investigate . . . write today for complete information.

Johnston & Jennings
Jolt Rollover Pattern-Draw Machines

Model	Table Size	Pattern Draw	Capacity
612	24″x30″	12″	600#
815	30″x40″	15″	1200#
920	44″x54″	20″	2000#
1020	50″x60″	20″	3000#

All J & J Rollovers are open end and therefore do not limit the length of flasks used.

JOHNSTON J&J JENNINGS

AN IMPROVED LINE!

- Jolt-Rollover-Pattern-Draw • Jolt-Stripper or Pin-Lift
- Jolt-Squeeze • Jolt-Squeeze-Pin-Lift
- Plain-Air-Jolt

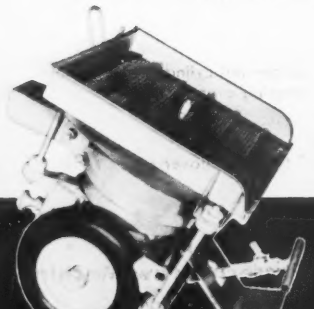
MOLDING MACHINE DIVISION
THE JOHNSTON & JENNINGS COMPANY
Division of Pettibone Mulliken Corp.
2424 North Cicero Ave., Chicago 39, Illinois

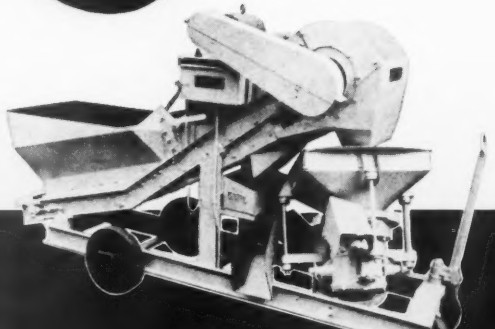
NOW the New MAGNARATOR

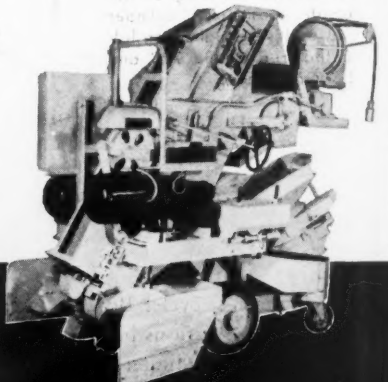
. . . An important addition to the B&P line of floor sand preparation machines!

Screenarated sand plus magnetic separation! The Magnarator fills an essential need for the small or medium size foundry. Perfectly balanced and rubber-tired, it is readily moved by hand from foundry floor to floor. Designed for shovel loading, it is built in two sizes with capacities of 20 and 30 tons of sand per hour—sand that is screened, magnetically separated and fully aerated.

Here's where the new Magnarator fits into the B&P floor sand preparation line!







THE SCREENARATOR

A sand conditioning investment *proved* sound in thousands of foundries the world over. Built in three sizes with capacities of 750, 1000 and 1500 lbs. per minute, Screenarators provide thorough screening and complete aeration of any type of sand. Rugged, dependable . . . trouble-free performance assured with this *lowest* cost sand conditioner!

THE JUNIOR NITE-GANG

Thoroughly foundry tested and approved, the Junior Nite-Gang is a high capacity, highly portable machine designed for use with a front end loader. With a capacity of up to 40 tons of sand per hour, the Junior Nite-Gang provides complete screening and aeration with magnetic separation. Four rubber-tired wheels assure easy movement through the foundry.

THE NITE GANG

Self-loading and power propelled, the Nite-Gang offers the ultimate in floor sand preparation. Shakeout sand is loaded directly from the floor, blended, magnetically separated, screened, doubly aerated and discharged directly into windrow or pile ready for molding. This one-man operated machine offers capacities of up to 50 tons of completely prepared molding sand per hour.

B&P

Write for bulletins!

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

BEARDSLEY & PIPER
Div. Pettibone Mulliken Corp.
2424 N. Cicero Avenue
Chicago 39, Illinois

Manufacturers of the Sandslinger • Speedslinger • Hydra-Slinger • Speedmullor • Mulbaro • Screenarator • Nite-Gang • Junior Nite-Gang • Preparator • Magnarator • B&P Combination Units • Roto-Feed • Roto-Mold • Gyra-Screen • and the entire Champion line of: Core Blowers • Blo-Matic Core Blowers • Rol-a-Cor • Speed-Draw • Molding Machines • Electric Riddles

LOOK TO

BEARDSLEY & PIPER

FOR BETTER METHODS

(*Continued from page* 200)

pounds of iron right in the ladle. I told Pug the whole thing sounded like a lot of baloney to me. "Tell the kid," I sez, "to keep out of them there places and also to quit reading fairy stories." Well, Bill, that was that and I heard no more about it.

However, Bill, here lately at one of the chapter meetings, a fella welded or spliced a brief reference to the same thing into his talk about running a cubelow. Later when I ast him how about it, he said he did not remember where he had picked up the item. That brings us down to the present and to the reason I am writing you this here letter. When I hear a thing once I may believe it or I may not believe it. To a limited extent I suppose you might say this is still a free country. When I hear a story the second time under widely different circumstances and conditions, I begin to wonder maybe there's something in it. So, here we are Bill at the $64 question. Have you ever seen, heard or read anything about melting iron in a ladle? Yours respectively, Joe the Pilgrim in the Slough, or Slew or Sluff of Despond.

"Seems to me," I said, "the worthy brother is crowding you at the turn, or squeezing you into a pocket, or whatever term these sporting people use when they are leading up to a description of a tense or critical situation. To slightly change the simile, I shall be interested to learn how you clawed your way off that lee shore, and beat your way out to the open sea and freedom."

"This is one of these here rare instances," Bill replied, "where the finger of Providence definitely was on the job. I happen to have a copy of the book containing the description of melting iron in a ladle. A very fine old gentleman, president of the company, gave the book to me when I crept shivering into his den one day and told him I was going to quit my job as apprentice in his foundry. Between his friendly talk and a gander through the book, I gained an entirely new outlook on the foundry industry. I decided to stay for the remainder of the apprentice term and give it a whirl. *The Moulder's Text Book* by Thomas D. West was first published in 1883. Through his prolific writing, exploration and experimental work, Mr. West probably was the most prominent and best known foundryman in the country."

"You need not tell me. I have read his books and am familiar with his history. I have enjoyed the acquaintance of his son and grandsons, all able and competent master foundrymen worthy descendants of the famous old pioneer. Push on, man. What about his chapter of melting iron in a ladle? I have read the story, but I am a little hazy on the details."

"With the dope right there in front of me," Bill said, "I had no trouble knocking out a reply to Joe, the worthy pilgrim in the swamp. I did not follow the example of some people I know and claim I had developed the idea in my own clever little head. I did not say I had done the work myself, or that it was done by my cousin Ed in Apahaukie. I don't believe in that kind of stuff. I set it down as it appears on pages 248-49-50. In a foreword Mr. West states the article first appeared in the *American Machinist*. His attention was attracted by the novelty of the idea. He decided to insert it with others in his book. The article is entitled 'Melting Small Quantities of Iron,' by Robert E. Masters, Columbus, Ga."

The following plan for melting 100 to 300 pounds of iron in a common ladle, I respectfully dedicate to Thomas D. West (as one of the odd methods of melting iron) for his second volume of *American Found-*

Need core plates that SPEED PRODUCTION?

. . . then use TRANSITE CORE PLATES that are light-weight and easy to handle

You'll find two important reasons why Transite* Core Plates mean faster production: First, core makers can handle more plates with fewer trips. Second, Transite Core Plates are easier to clean . . . core wash, sand, etc., do not adhere to them as readily as to other core plate materials.

Here are more *reasons why you can profit by using Transite Core Plates:*

They give long service—Made of tough, fibrous asbestos and cement, Transite Core Plates resist shock and corrosion—will not crack or break easily—require little, if any servicing. *Performance records of 8, 10 and 12 years are not unusual.*

They maintain accuracy — Transite Core Plates stay smooth through long, hard service. Foundrymen who have used them for years report minimum warpage.

For cores of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details write Johns-Manville, Box 60, New York 16, N. Y.

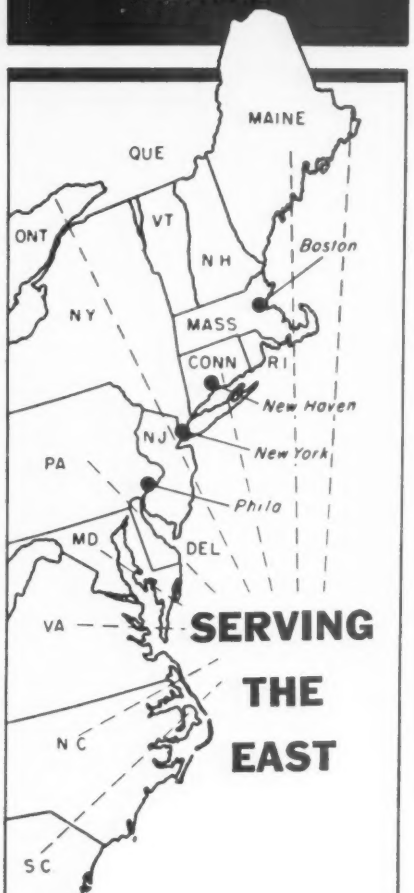
JM PRODUCTS

*Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES

Made of Asbestos

SINCE 1905
A GOOD PROPOSITION
ALWAYS



SERVING THE EAST

COKE
Foundry
Screen Sizes
Petroleum

PIG IRON
Basic
Foundry
Malleable
Silvery
Spiegeleisen

FLUXING STONE
Dolomite
Calcite
Fluorspar

FERRO ALLOYS
Chrome
Silicon
Manganese
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ry Practice. I imagine I can see a smile illuminating the features of the moulders in some of the finely equipped foundries where they melt from 20 to 50 tons of iron per day, at the idea of melting a couple of hundred pounds. Still there are hundreds of small shops where a knowledge of the method for doing so would be a source of considerable profit, besides sometimes retaining a customer. For instance Mr. A has a small shop and casts only once or twice a week. A short distance from him (perhaps in the same town) B & Co. have a large shop and cast every day. A has just taken off a heat and will not cast again for several days. In walks a customer with a broken down job that will require from 10 to 250 pounds of iron to pour off. He must have it immediately. A doesn't want to lose the job, or run the risk of losing a customer.

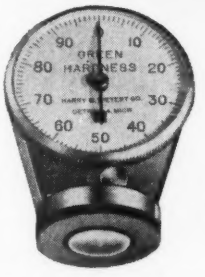
Now for the plan for doing the job and retaining the customer. Take a common 300-pound ladle daubed in the ordinary way and fire it up until you have a solid coal or coke fire. Then take a plain cylinder made of light boiler plate, 36 inches long and of the right diameter to fit the top of the ladle. This cylinder should have a 2 inch hole at the lower end for a tuyere pipe and should be daubed up same as the ladle and dried ready for use. Place the cylinder on top of the ladle, daub up around the joint and add fuel until you have a good bed 6 or 7 inches above the tuyere. Put on such iron as you wish to use and as much as you need to pour off the piece. Nearly all small foundries have blast pipes that can be detached from the cupola without much trouble and used for blast by adding a small piece of pipe to fit the tuyere hole in the cylinder. After the iron is down, lift off the stack and pour the iron as usual. By this method a ladle holding 300 pounds can be melted full of good hot iron in a short time.

Completes Sound-Slide Films on Safety

National Gypsum Co., 325 Delaware Ave., Buffalo 2, has completed a series of sound-slide films on safety designed to be presented in four 45-minute discussion training sessions for plant employees. The films and continuity highlight the factors which effect efficient production, describe the elements of industrial accidents, discuss how accidents are major production inefficiencies and show that accidents do not necessarily involve personal injury.

Designed for use in National Gypsum's own plants, the films and records may be purchased by other industrial concerns from Human Relations for Industry, 443 Delaware Ave., Buffalo

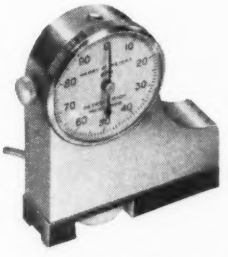
HARDNESS CONTROL PAYS



No. 473 GREEN HARDNESS TESTER

One fast pocket-size tester for all green sand molds and cores. Buckles, scabs and dirt result from variable mold hardness. Veining and burn-on result from uneven core ramming.

Use the Green Hardness Tester to find the right hardness and control at that value for improved casting quality.



No. 673 DRY HARDNESS TESTER

A rapid Hardness tester for baked cores and dried molds. Use the Dry Hardness Tester to control surface hardness of production cores. Make adjustments in binder, moisture or baking to obtain best hardness based on casting results. Note these advantages:

1. Always ready for use.
2. Scratch Hardness in three seconds.
3. Rotary Hardness in two seconds.
4. Direct easy-to-read dial.
5. Does not spoil core surface.

Write for Leaflet "Mold and Core Hardness Facts"

CONTROL EQUIPMENT
HARRY W. DIETERT COMPANY
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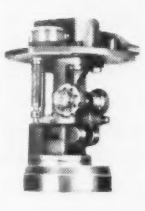
HOW G-E SHELL RESIN HELPS CUT CASTING COSTS

This gate of eight castings—pump bodies for Bijur Lubricating Corporation, Rochelle Park, N. J.—was cast by Production Pattern & Foundry Company, Chicopee, Mass., *using the new shell molding process.* The shell molds were bonded with General Electric's new phenolic shell resin.

Why was shell casting used? Let Mr. William E. Durnan, Manufacturing Manager of Bijur, tell you in his own words: *"Producing our pump bodies by the shell method results in lower casting costs. The smoothness of the castings allows us to reduce or eliminate entirely some of the machining operations. The dimensional stability and uniformity of the castings make for easier tooling, and their soundness and lack of porosity are of great advantage in hydraulic equipment of this type. Weight, too, is reduced by the use of shell molding."*



Customer acceptance like this is one of many reasons why foundrymen are turning to the shell molding process and the use of new G-E resins. If you are not yet using the shell method, you'll want to find out more about it and the part that G-E shell resins and G-E silicone parting agents play in helping you realize the tremendous advantages this process affords. G.E. has prepared an informative brochure telling what it can mean to *you.* Samples and technical service are also readily available.

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MAGNESIUM GROUP MEETS AT NEW YORK

Sees Great Expansion In Use of Castings

By SAMUEL W. BAKER
New York Editor
FOUNDRY

OPPORTUNITY for foundries to participate in magnesium's tremendous growth potential is greater than ever before now that the metal is again plentiful and unrestricted for civilian use, a record-breaking gathering at the eighth annual Magnesium Association meeting in New York, Nov. 10-11, was told.

Interest of magnesium men in foundry applications was apparent from the time devoted to casting division sessions at the meeting. Foundrymen's interest in magnesium was attested by the time principal speakers spent answering questions fired from the floor after presenting technical papers on new techniques and developments in magnesium casting.

Versatility of magnesium for casting applications was demonstrated by the range of technical discussions. Papers covered the size field from investment castings weighing a fraction of an ounce to a 1620 pound radar base housing now cast on a production basis. Attention to papers describing large thin-walled airframe castings was especially keen. Papers covering developments in shell mold casting and grain refining of magnesium alloys rounded out the session. Typical magnesium castings for defense and civilian applications were displayed at the meeting.

A complete slate of new officers was elected by the association. J. S. Kirkpatrick, director of research and development, Brooks & Perkins Inc., Detroit, succeeds A. W. Winston as president. W. C. Murray, Utica Radiator Corp., Utica, N. Y., replaces E. H. Perkins as vice president, and R. D. Taylor, Federated Metals Division, American Smelting & Refining Co., New York, was named to the treasurer's post previously held by Otis E. Grant.

Stimulus of the mobilization program on development of new alloys and perfection of sound casting techniques has been great. Today about 3000 tons of magnesium goes into defense products monthly, while only about 1000 tons is used for civilian applications. Foundries are fast learning new tricks in magnesium casting, and think they've got the microshrinkage bugaboo licked. Still, magnesium men noted that the past three years have seen greater relative progress in wrought product applications than in cast products.

An interesting defense application —but one far from a production reality—is a cast magnesium alloy wing section produced on an experimental basis. It was described by W. D. Stewart, Aluminum Co. of America. The casting, weighing 200 pounds, was made by Alcoa for Northrop Aircraft Inc., as part of a research project sponsored by the Air Force.

The clamshell-design wing section was cast in identical halves and joined mechanically by bosses extending along longitudinal stringers. Casting presented special problems of mold design, gating so that metal could be introduced uniformly, and heat treating without losing airflow contour. Cast recesses were left in the mold for joining skin sheet on the surface. Alcoa says it experienced no problems with interior cores or feeding the skin section. Minor sanding was the only finishing operation necessary. While there's no thought of tooling up for mass production of this unit, its development may stimulate other applications such as access doors and cargo doors in the aircraft and transportation industries.

J. S. KIRKPATRICK
President
The Magnesium Association

Magnesium alloy castings as large as any present day ferrous castings can be made, according to Elmer Lanfrancke, vice president, Rolle Mfg. Co., Lansdale, Pa. This development, Mr. Lanfrancke believes, greatly broadens the horizon for magnesium foundries. This company is now producing a radar base housing measuring 90 x 100 x 33 in. deep —so large it couldn't be brought into the building for display. Rolle uses an all-core drag mold for this casting, with a few additional openings to permit core support of the drag face.

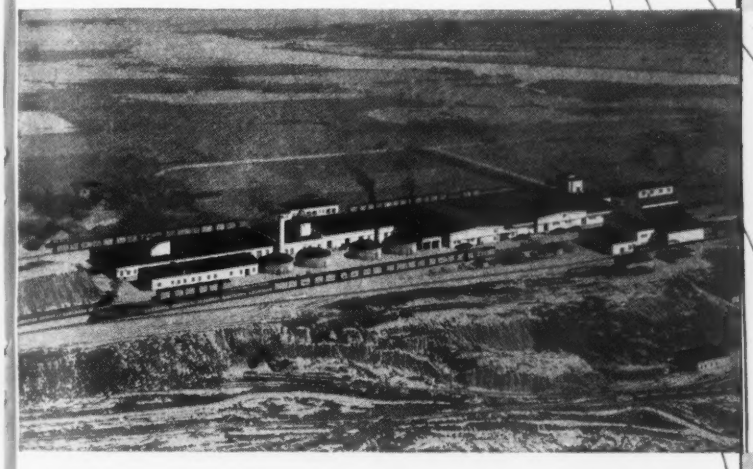
Conventional molding practices were followed in mold design, and pouring is from four stations simultaneously. Pattern was made to one-tenth shrink allowance. First pours were made with hollowed cores, but company made several castings with solid cores and found no difference in dimensions obtained. To gain more elongation for ductility, company used AZ-63 alloy. Tier thicknesses of cores were limited to 9 in. in height to facilitate baking and allow for versatility in gating. General wall thickness of the 1620-pound casting is ⅜-in. Finished unit is machined within tenths of thousandths, a good indication of the precision needed in casting.

New high-speed planes, combining strength and lightness in design, create a problem of many peculiar shape component parts going into the plane's general structure, said R. H. Osbrink, Osbrink Mfg. Co., Los Angeles. Mr. Osbrink believes his company's development in the past ten years of a process for casting complicated fabricated units in magnesium opens an entire new field to the sand casting industry. An advantage of magnesium casting alloys, Mr. Osbrink noted, is that mechanical properties increase as cross section decreases. Casting of many aircraft parts can save money too; a large duct tube was successfully cast at a saving of nearly $600,000 on 500 airplanes.

The guided missile program has created a demand for very large castings produced with minimum weight, said Mr. Osbrink. Cast components in a large guided missile involve approximately 200 pounds of magnesium. Airborne radar equip-

(*Continued on page* 208)

ILLINOIS CLAY PRODUCTS HAS ALL 3



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The Illinois Clay Products Company, Goose Lake Plant, is located near Joliet, Illinois—only 55 miles from Chicago. Above is a map showing the excellent shipping facilities provided by the Elgin, Joliet & Eastern Railway—the Outer Belt Line.

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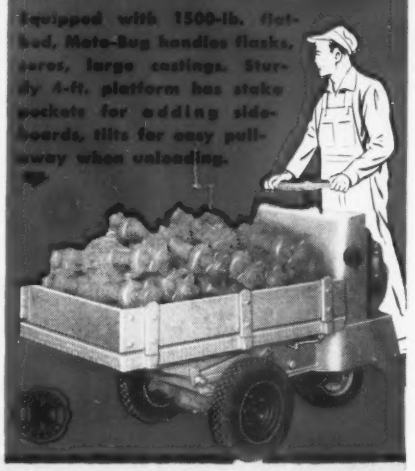
Kwik-Mix Moto-Bug carries up to 1500 pounds or 10 cu. ft. (struck) of bulk materials each load . . . handles sand, scrap, slag, coke, small castings and any other materials that can be shoveled, stacked or loaded into its big capacity hopper. This low-cost power wheelbarrow climbs 20% ramps fully loaded, turns in its own length . . . 33" width clears crowded aisles, narrow doorways. Moto-Bug has full power forward and reverse for traveling, backing or spotting . . . large steering wheel, with 3.6-to-1 gear ratio, for effortless steering and maneuvering . . . instant gravity dump with snub-line control. Interchangeable attachments: flatbed, 5-foot fork lift, and scraper.

Hauling castings from cleaning room to storage . . . delivering sand to mixers or molding stations . . . handling coke and slag around ovens . . . cleaning up scrap in shop and yards, there's no limit to Moto-Bug usefulness in foundries and metal-working shops.

Equipped with 1500-lb. flatbed, Moto-Bug handles flasks, cores, large castings. Sturdy 4-ft. platform has stake pockets for adding sideboards, tilts for easy pull-away when unloading.



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KWIK-MIX (Koehring Subsidiary) "NO PUSH — NO PULL" Moto-Bug®

(*Continued from page* 206)

ment offers another fertile field for thin magnesium castings because of the weight factor and easy means of production. Mr. Osbrink believes world conditions have stimulated the nonferrous foundry industry to such an extent that it has shown more progress in the last ten years than it had shown in the past century, and that startling new developments can be expected in coming years.

Satisfactory investment castings of magnesium can now be made, said Paul L. Butler, chief metallurgist, Arwood Precision Casting Corp., Brooklyn, N. Y. Initial work with magnesium investment castings by the company ran into considerable difficulty. Molten metal tended to react with the investment material, causing the metal after casting to explode and blow out of the flask with a "flower pot" type of display. Another problem was sub-surface oxidation or burning. Arwood found the answer by adding a non-volatile inhibiting compound to the investment mixture and development of a method to remove the oxygen from the flask after burnout. In investment casting, said Mr. Butler, gating and risering are very critical because of high temperatures.

Cite Advantages of Process

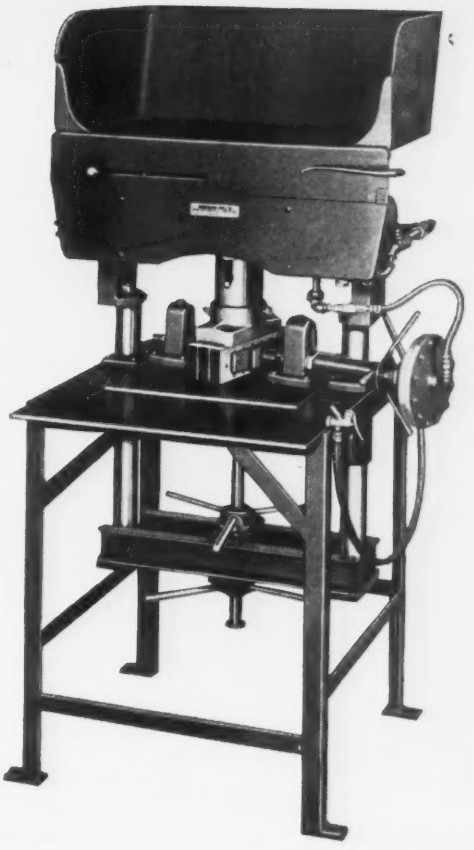
Shell molding can be used to greater advantage by considering it not as a process to replace existing forms of producing castings but as a supplement to these methods, said A. J. Marotta, Utica Radiator Corp., Utica, N. Y. Advantages of the process to magnesium foundries cited by Mr. Marotta included: Close dimensional tolerances, extremely smooth finish, low metal loss because fewer risers, chills and gates are necessary, low scrap loss, high production per man-hour with unskilled labor, and indefinite and economical storage of molds. Two important problems the industry must solve are use of inhibitors in the sand mix and shake-out difficulties. Utica Radiator found difficulty in removing shell mold from magnesium castings, particularly in depressed areas. Good ventilation of the foundry is a must, Mr. Marotta noted, because of disagreeable odor resulting after pouring magnesium.

A practical and succesful method of grain refinement of magnesium sand and permanent mold castings employed by Aluminum Co. of America was described by R. T. Wood. His paper will be presented in full

(*Concluded on page* 211)

Redford CORE BLOWERS

Assure MAXIMUM Production With MINIMUM Effort



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8 OUTSTANDING FEATURES:

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2. Large sand supply hopper.
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4. Easy accurate locating of core boxes.
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7. Quick change, fully adjustable, vertical clamping attachment.
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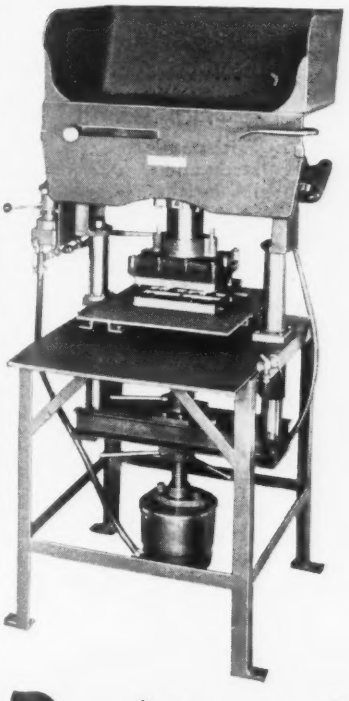


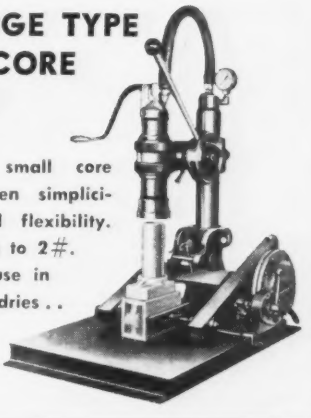
A fast and accurate DRAW TYPE core blower for small work—has stationary sand magazine and many additional features assuring maximum production. Quickly adjusted to accommodate core boxes not requiring the draw feature. Can be equipped with clamping attachment for vertically split core boxes.

SIX FEATURES:

1. MAXIMUM SAFETY—Operator must use both hands at once to clamp core box and blow cores.
2. ACCURATE DRAW—Stationary sand magazine and long lead on draw table shaft assure accurate draw.
3. ADJUSTABLE LENGTH OF DRAW—Quickly changed without changing height of table.
4. FLEXIBILITY—Easy adjustments permit use of draw feature even on short run jobs. Draw type magazine heads having removable blow plates are interchangeable with regular No. 2 magazine heads.
5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
6. PROVEN—The No. 2-D is being used in leading foundries everywhere. Backed by the Redford reputation for quality equipment.

Write for Specification Bulletin "D"

THE CARTRIDGE TYPE BENCH CORE BLOWER



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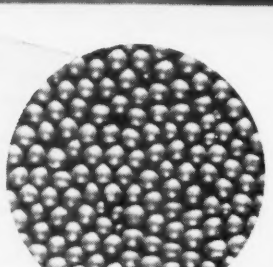

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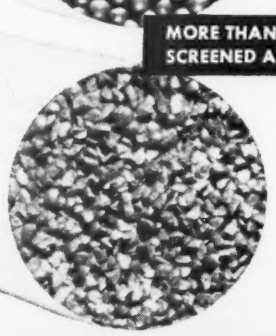

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(*Concluded from page* 208)

in an early issue of FOUNDRY.

Reporting on magnesium progress in Britain was Major C. J. P. Ball, Magnesium Elektron Ltd. Heavy vehicle builders in Britain are using increasingly larger quantities of castings rather than wrought products. A major development is use of a 52-pound transmission casing for a light tractor by Standard Motor Co. Sterling Metals Ltd., Coventry, supplied more than 1500 of these castings per week at a finished price competitive with cast iron, despite magnesium's relatively high price in the U.K. Some 250,000 of these transmission casings have been built into standard Ferguson tractors.

Promising to rival the Ferguson application, said Major Ball, was German use of magnesium alloy castings for the Volkswagen car. Britain's aircraft industry's use of magnesium castings today runs more than three times that for other commercial purposes. Roughly 30 per cent goes into engines and the remaining 70 per cent for wheels and airframe castings. Commercial usage is divided approximately this way: 50 per cent to the automotive industry, 15 per cent to building trades, 15 per cent to textile industry, and 10 per cent each to pressure die castings and magnesium anodes for cathodic protection of iron and steel structures.

Major Ball sees cathodic protection as still in its infancy, and thinks that one of the largest future demands for magnesium alloy castings will come from their use to protect such steel structures in sea water as pilings, buoys, ship bottoms, dock gates; and on land, buried pipe lines, cables, gas holders and such equipment.

Marks Sesquicentennial

In celebration of its 150th anniversary Georg Fischer A. G., Schaffhausen, Switzerland, has published a 214-page book in German recording the history and present-day activities of the firm. Book is divided into two sections relating to the general and specific phases of the enterprise. The first describes the present status of the firm and its development from 1802 to 1952. The second part pertains to the malleable iron, steel, gray iron, light metal and machine tool products made; the commercial and financial aspects as well as personnel and social phases. Brief descriptions of the firm's foreign plants are included.

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Activities of Foundry

GROUPS

Central Illinois

ROMANCE of Metals" was the title of a talk presented by G. A. Pealer, General Electric Co., Elmira, N. Y., at the Nov. 3 meeting of Central Illinois Chapter of the AFS. Meeting was held at the American Legion Hall, Peoria, Ill. Special guest at the meeting was A. A. Hilbron, AFS convention and exhibits manager, who brought greetings to the chapter from national headquarters. John Kauzlarich, methods engineer, Peoria Malleable Casting Co., Peoria, was technical chairman.

Mr. Pealer related the development of casting metals from the stone age to the present. In present day operations he believes pattern engineers are necessary. These men should have a background which includes coreroom, foundry, machine shop and pattern shop. He cited many examples where pattern engineers effected economy in overall operations by simplifying casting design, comparing fabrications with castings and recommending the correct type of pattern for a desired quantity of castings.

Mr. Pealer also presented a technicolor movie "Water" which showed soil conservation, water uses and conservation of water.—*L. E. Kinsinger, Caterpillar Tractor Co.*

Birmingham

APPROXIMATELY 100 members and guests were present at the Nov. 21 meeting of Birmingham District Chapter of the AFS held at the Tutwiler Hotel, Birmingham. George Hurt, the coffee speaker, pointed out in a talk entitled "Rehabilitation of Handicapped Persons" that 1800 handicapped persons in the state were made self supporting during the past year through training in trades or skills. This training supplements the medical examinations which the state's welfare department provides.

Featured during the technical session was Ross Martin Jr., superintendent, production, McWane Cast Iron Pipe Co., who spoke on "Statistical Quality Control." Mr. Martin presented several slides to indicate on charts the effectiveness of quality control through statistics. The subsequent discussion indicated genuine interest in the group to learn more about this type of quality control program. Fred K. Brown, Fred K. Brown Co., the chapter's chairman, presided at the meeting, and Biddle Worthington, McWane Cast Iron Pipe Co., and chapter vice chairman, introduced the speaker.

Tom H. Benners, chairman of the chapter's Educational Committee, announced that entries in this year's apprentice contest already have topped last year's total. Prizes of $50 and $25 defense bonds will be given the first and second place winners and $10 in defense savings stamps will be given as third place prizes.—*J. P. McClendon, Stockham Valves & Fittings*

Central Ohio

HOLDING its annual meeting at Springfield, O., Nov. 10, at Bancroft Hotel, Central Ohio Chapter of the AFS heard J. S. Schumacher, chief engineer, Hill & Griffith Co., Cincinnati describe a "Fool-Proof Sand."

He used slides to illustrate the discussion of his company's work on a sand which is reputed to be "fool proof." It is primarily a four-screen sand which offers a uniform mold hardness after sufficient ramming. This sand is low in cost and has been found desirable for many sizes of castings.—*Wilfred H. White, Jackson Iron & Steel Co.*

Connecticut Non-Ferrous

A DISCUSSION of shell molding practice was presented by Richard Herold, Foundry Products Department, Borden Co., New York, at the Oct. 15 meeting of the Connecticut Nonferrous Foundrymen's Association.

The speaker predicted a good future for shell molding, basing his forecast on the imposing list of organizations that have gone into the process. For the foundry contemplating getting into shell molding, cost evaluation is difficult because of the number of factors involved. Material costs are easy, but it is hard to evaluate greater productivity per square foot of floor space, greater metal yield, simplified molding by either women or unskilled help, fewer rejects, cleaner working conditions, less sand handling, reduced machining, better surfaces and sounder castings. On material costs it is easy to fig-

(*Continued on page* 214)

CENTRAL ILLINOIS Chapter of the AFS was visited at its Nov. 3 meeting by A. A. Hilbron, manager of conventions and exhibits, AFS. Left to right are Mr. Hilbron, John Kauzlarich, methods engineer, Peoria Malleable Castings Co., Peoria, Ill.; Henry Felten, foundry superintendent, Peoria Malleable Castings Co., and G. A. Pealer, design supervisor, General Electric Co., Elmira, N. Y., principal speaker, whose topic was "The Romance of Metals"

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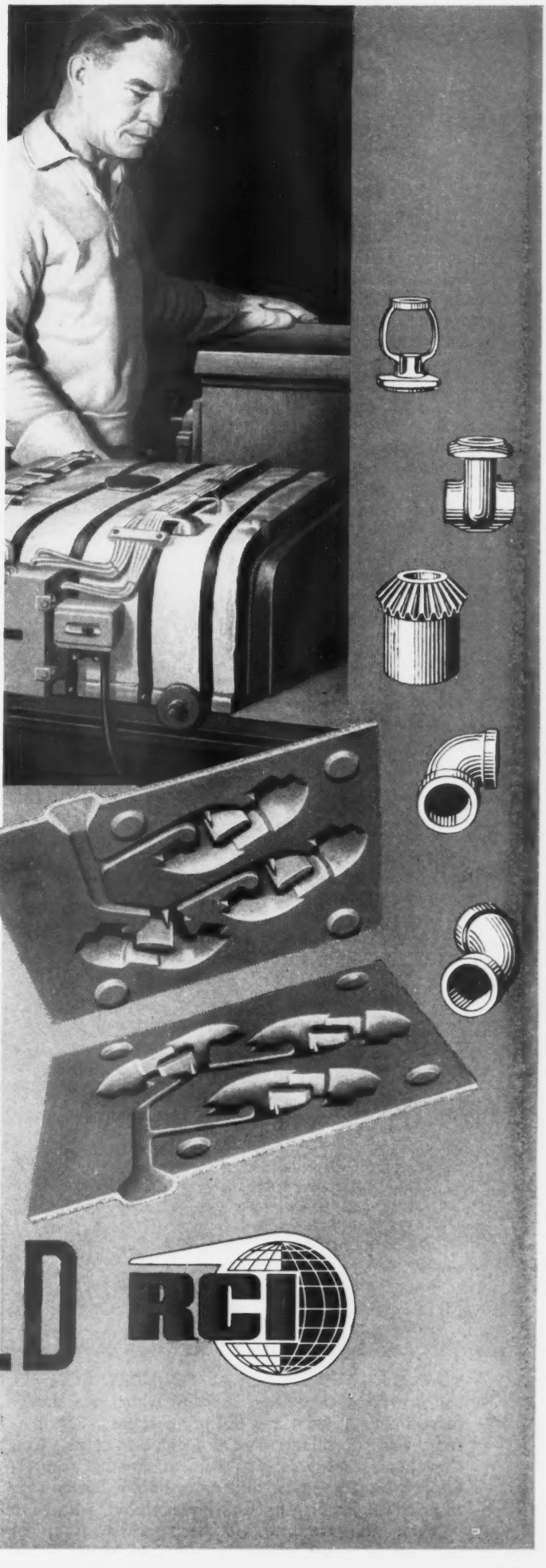
SHELL MOLDS



• Shell molding heralds a new era in foundry casting methods. And we believe you'll find the key to *lower cost* shell molding in FOUNDREZ 7500. Tests indicate that — due to the greater tensile strength attained with this new RCI powdered phenolic—FOUNDREZ 7500 actually "goes farther" than similar resins, pound for pound, in shell mold production. Sample lots available for your own testing on request from . . .

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Sodium Sulfate • Sodium Sulfite

(*Continued from page* 212)

ure for a ten-cavity mold weighing 6½ lb the cost would be 12.2 cents per mold for sand and resin. This is using $4.70 per ton for sand and resin at 33 cents per pound with a mixture composed of 95 lb sand and 5 lb resin. Adding 3.1 cents per mold for labor (60 molds per hour at $1.90 an hour) cost of the mold is 15.3 cents. However, other costs, particularly patterns, enter the picture.

Mr. Herold believes molds should be supported unless the castings are relatively small. Shells for small castings are being glued together quite successfully through use of urea resin glues which are prepared for fast drying.

Gating is an important factor in the process. It has been found that the long vertical drop, the smooth mold surfaces and the absence of steam chilling call for smaller down sprues, runners and ingates than in green sand molding. Less shrinkage is encountered, therefore smaller risers are necessary. Bottom gating is generally favored to minimize turbulence.—*John V. McCarthy, Federated Metals Division, American Smelting & Refining Co.*

New Jersey

CHARLES J. Schwalje, general foundry superintendent, Worthington Corp., Harrison, N. J., discussed methods of modernizing a foundry for jobbing work at the regular monthly meeting of the New Jersey Foundrymen's Association, in Newark, N. J., Nov. 17.

He outlined various improvements made at the Worthington foundries the past five or six years, pointing out that although the company's total volume is large, 95% of its work is short-order work, involving many orders running from one to 12 pieces.

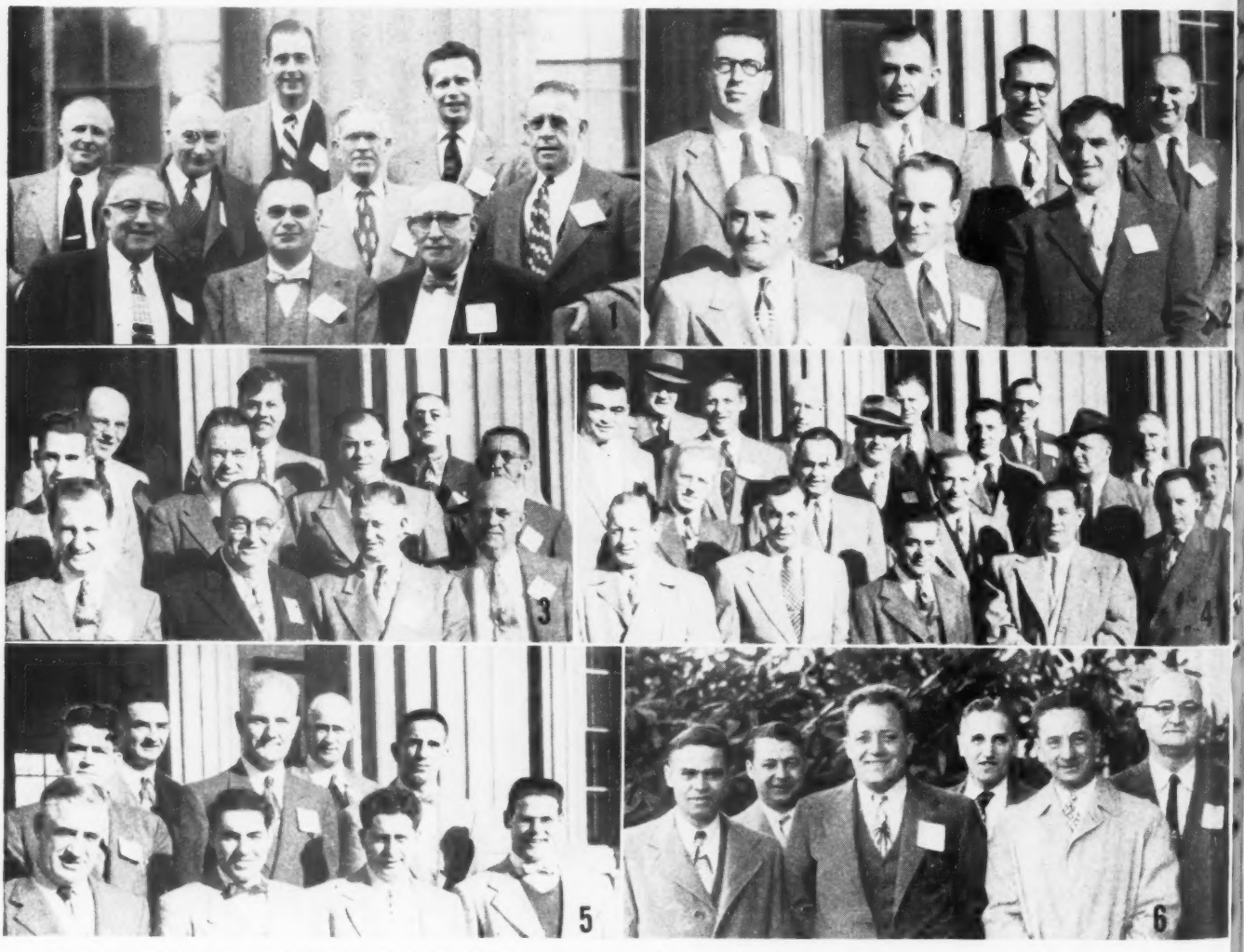
He commented on the use of roller mold conveyors, spoke of special techniques for getting high machine molding production on short order work. He discussed various types of sand handling, from belt conveyors and overhead chutes to crane transportation to floor or raised sand box.

He touched on such phases as the use of sandslingers, core blowing of large cores, techniques for applying incentive systems to short-order work. The speaker also focused attention to various types of cleaning room equipment and to the importance of a scrap and quality control program.—*Ben K. Price.*

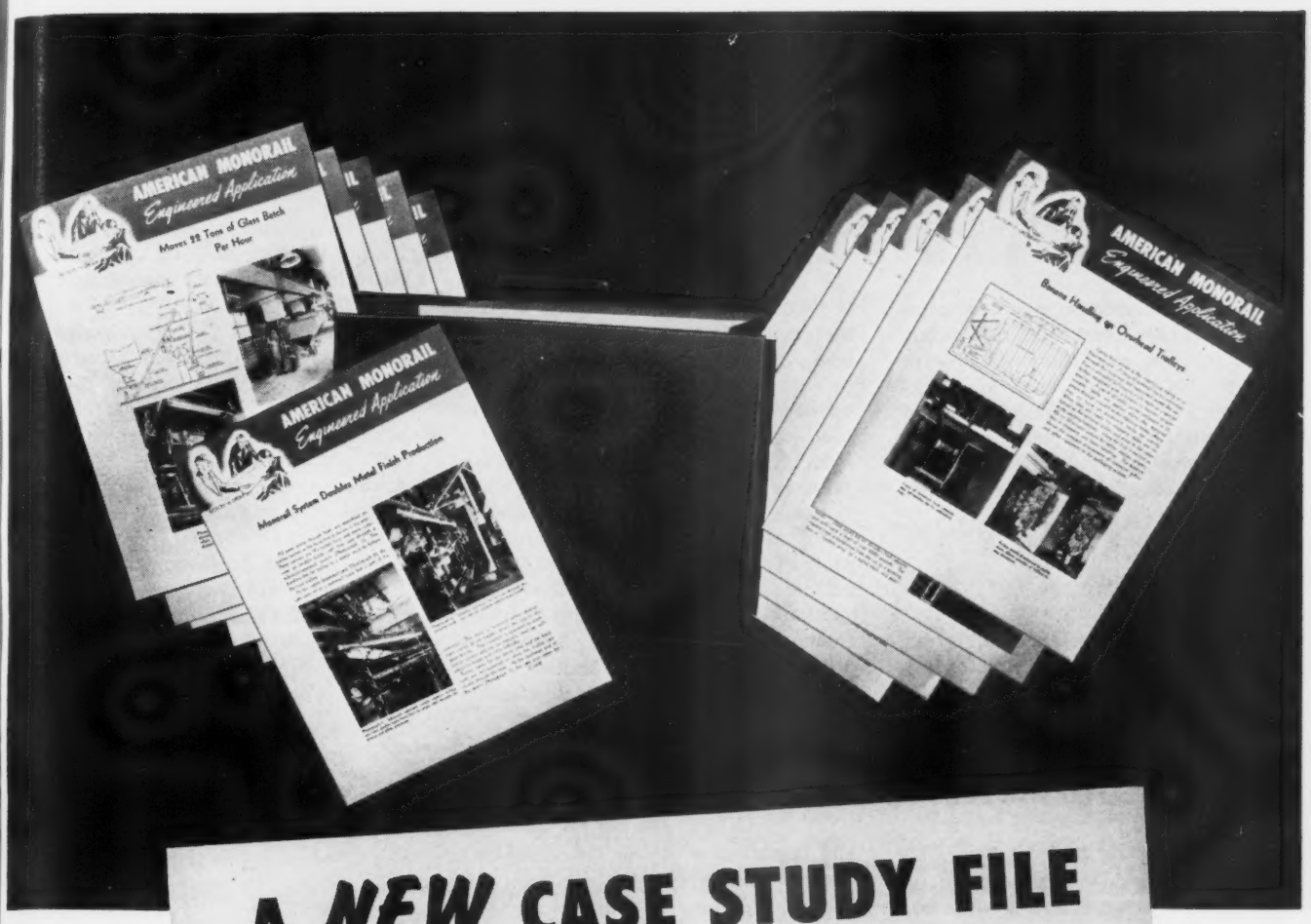
Mid-South

A FORMAL request to organize a Mid-South Chapter of AFS has been made by 55 foundrymen and

(*Continued on page* 216)



NEW ENGLAND REGIONAL FOUNDRY CONFERENCE drew 600 persons, some of whom are shown here. In Fig. 1, front row, left to right, are L. P. Robinson, vice president, Archer-Daniels-Midland Co., Cleveland; F. Ray Fleig, president, Smith Facing & Supply Co., Cleveland, and Harry Impey, Boston representative, Tabor Mfg. Co., Philadelphia, who were enjoying the pleasant weather with a group of friends. In the other views are shown groups, by companies, of others who attended the conference. They include, Fig. 2, C. B. Cottrell & Sons, Westerly, R. I.; Fig. 3, Whitin Machine Works, Whitinsville, Mass.; Fig. 4, Draper Corp., Hopedale, Mass.; Fig. 5, Whitman Foundry Inc., Whitman, Mass.; Fig. 6, Chas. G. Allen Co., Barre, Mass. Photos by C. A. Wyatt, Debevoise-Anderson Co.



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(*Continued from page* 214)

A meeting was held Nov. 7 at the Chisca Hotel, Memphis, at which William W. Maloney, secretary-treasurer of the AFS, and Albert Hunt, National Bearing Division of American Brake Shoe Co., St. Louis, and a national director of AFS, spoke on the aims, purpose and various activities of the American Foundrymen's Society.

The new chapter's steering committee officers include: Chairman, Earl Kreunen; vice chairman, Henry Ellis; program chairman, C. W. Parker; secretary-treasurer M. B. Parker Jr.; publicity Earl Pace. Directors are: Charles Gray, E. J. Johnson, Walter Tragarz, M. B. Parker Sr., and Fred Brown Jr.

Reading

EFFECTIVE material handling can reduce foundry costs substantially, William Morley, operating manager, Olney Foundry, Link-Belt Co., Philadelphia, told 100 members and guests of the Reading Foundrymen's Association at its Nov. 18 meeting held at the Berkshire Hotel, Reading.

Discussing "The Importance of Material Handling in Foundries," Mr. Morley estimated that 120 to 150 tons of material are handled to produce one ton of castings and that 30 to 40 per cent of a foundry's labor force is engaged in the movement of that material. For that reason, any reduction of the volume of handling, or more effective handling of the material will have a great effect on the cost of the castings.

In addition to this direct saving, material handling can reduce costs, improve working conditions, and eliminate safety hazards. A recent report of the National Safety Council indicates that 31 per cent of reported industrial accidents stemmed from mishandling of materials. Association President James S. Hinkley, Dick Bros. Inc., presided.—*W. I. Cassidy.*

New England

APPROXIMATELY 125 member of the New England Foundrymen's Association were guests of t Massachusetts Institute of Technology Student Chapter of the AFS Nov. 12. Dinner was served in the ne foundry laboratory located in the ne Sloane building at MIT which house facilities for metals processing activities.

J. B. Stazinski, vice president of NEFA, accepted the greeting from Dix Chandley, president of the student chapter. Prof. Melvin Adams explained MIT activities that are being carried on in the interest of foundries, and expressed appreciation to industry and individuals who have made available most of the equipment in the laboratory.

It was gratifying to the New England association members to learn that about 50 students utilize the foundry equipment on Saturdays and

(*Continued on page* 218)

Missouri School of Mines FEF Advisory Group Meets

THE St. Louis and Kansas City Industrial Advisory Group of the Foundry Educational Foundation met with Dean Curtis L. Wilson and other faculty members of the metallurgical engineering, mechanical engineering and humanities departments of the Missouri School of Mines and Metallurgy, Rolla, Mo., on Oct. 1, to congratulate FEF scholarship winners and to plan the 1952-53 program for the Rolla Student Chapter of the AFS.

Plans for completing the present new foundry were discussed, together with ideas for interesting high school students in selecting the foundry industry as a career. Reporting on the progress made at the school during the past year in foundry work, Dean Wilson emphasized the importance of the Industrial Advisory Group's role in developing the school's foundry and in placing students in the industry.

After the meeting, a social gathering and barbecue presided over by A. L. Hunt was held at the farm of Dr. D. S. Eppelsheimer.

From left to right in front row are Henry Meyer, General Steel Castings Co., Granite City, Ill.; D. M. Hochswender, Witte Engine Works, Kansas City, Mo.; George E. Mellow, Liberty Foundry, St. Louis; Webb Kammerer, Midvale Mining & Mfg. Co., St. Louis; A. L. Hunt, National Bearing Division, American Brake Shoe Co., St. Louis; L. A. Kleber, General Steel Castings Co., Granite City, Ill.; J. A. Williamson, M. A. Bell Co., St. Louis, and Ralph Hill, East St. Louis Castings Co.

In second row, left to right, ar D. R. Bogue, S. J. Cole, A. J. Selvaggi, M. J. Smid, R. L. Crosby and Alfred Neiman, FEF scholars.

From left to right in the third ro are Ralph Hollocher and Jac Humphry, FEF scholars; Dr. A. Miles, chairman, department of mechanical engineering; R. Abendroth and Jack Wheeler, FEF scholars.

In the last row, left to right, are Dr. A. W. Schlechten, chairman, department of metallurgical engineering; Donald Dean, administrative assistant; Prof. S. H. Lloyd, chairman, department of humanities; R. V. Wolf, instructor of metallurgical engineering, and Dr. D. S. Eppelheimer, professor of metallurgical engineering and faculty adviser, FEF.

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PRINCESS WENATCHEE: . . . like helping to make the metal that went into this tank and other products vital to the defense program . . .

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NORTHEASTERN OHIO Chapter of the AFS heard a discussion of core blowers at its Oct. 9 meeting. Top view, left to right, are speaker John A. Mescher, core department, Unitcast Corp., Toledo, O., and Chapter President Frank C. Cech, patternmaking division, Cleveland Trade School. In left view, below, left to right, are Harold Wheeler, personnel director, Superior Foundry Inc., Cleveland, and Chapter Vice President Stephen E. Kelley, assistant general manager, Eberhard Manufacturing Division, Eastern Malleable Iron Co., Cleveland. Right view, from left to right, are Jack Cleary, vice president, Sand Products Corp., Cleveland, and David Clark, plant manager, Forest City Foundries Co., Cleveland. Photographs by courtesy of Sterling N. Farmer, Sand Products Corp.

(*Continued from page* 216)
holidays to conduct their own experiments with the several aspects of the foundry process. Equipment includes small cupolas, a sandslinger, molding machines, an electric arc furnace, induction melting equipment, sand mixing equipment and shakeout in addition to the necessary run-of-the-mill foundry equipment.—*Myron DeHollander, General Electric Co.*

Northeastern Ohio

TWO technical speakers were featured at the Nov. 13 meeting of Northeastern Ohio Chapter of the AFS. They were Tom E. Barlow, Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago, and Walter Siebert, Cleveland Standard Pattern Works, Cleveland.

After dinner the 233 foundrymen and guests saw "A Career in Metals," a sound-slide film produced by Northwestern Pennsylvania Chapter of the AFS. Earl M. Strick, Erie Malleable Iron Co., Erie, Pa., introduced the film which is designed to stimulate interest of young men and women in foundry work as a career through showings to young people, parent-teacher associations and service clubs.

Mr. Barlow's talk concerned "Casting Defects in Relation to Sand Practice." He discussed fundamental sand tests which may be performed in the laboratory with instruments or in the foundry by an experienced man who simply squeezes a handful of sand. These tests indicate whether sand is wet or dry, weak or strong, brittle or tough, fine or coarse. Other tests in the laboratory indicate hot strength, permeability and flowability. He then outlined casting defects resulting from molding sands with characteristics either above or below optimum as indicated by these tests.

In conclusion, Mr. Barlow emphasized that sand is only one item which causes casting defects. When causes of defects are being traced, all factors should be considered and the blame should not be placed arbitrarily on any one item. Placing the blame for defective castings on a pet peeve is an expensive practice in any foundry.

Mr. Siebert, speaking to a meeting of the chapter's patternmaking division, discussed "Building Sturdy Patterns." He stated that patternmakers should know engineering, machine making, molding and casting to be able to make effective patterns. In addition, they must take pride in their work. Mr. Siebert emphasized particularly that no pattern should be designed without the approval of the foundry which will use it. There should, he stressed, be no such thing as a cheap pattern, even for one casting.—*Robert H. Herrmann and Jack C. Miske*

NORTHEASTERN OHIO Chapter of the AFS met Nov. 13 at Tudor Arms Hotel, Cleveland. Above, left to right, are: Tom Barlow, sales manager, Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago, principal speaker; Earl M. Strick, finishing superintendent, Erie Malleable Iron Co., Erie, Pa., coffee speaker, and Frank Cech, Cleveland Trade School, chapter president. Photo by courtesy of Tom Gallagher, Lake City Malleable Co.

Rochester

FOUNDRY Equipment and Dust Control" was the topic for discussion at the Nov. 11 meeting of Rochester Chapter of the AFS. Ray Moore, Claude B. Schneible Co., Detroit, showed those present through an old style foundry and then through the same foundry after it was modernized. The Studebaker Co. provided the basis for his talk.

Push-button control is the nerve center of the new foundry. Pig iron and scrap metals are stored in bins which are loaded and emptied by cranes having magnetic lifting devices. Cupola tapping is controlled by push-buttons operated by the operator of the crane which conveys the molten metal to the pouring stations. Shakeout, core knockout and cleaning also are performed automatically with a minimum of labor.

Supplementing the slide lecture, Mr. Moore presented a moving picture "The Invisible Shield," which illustrates heat and dust control by controlled circulated air.—*Herbert G. Stellwagen, Hetzler Foundries Inc.*

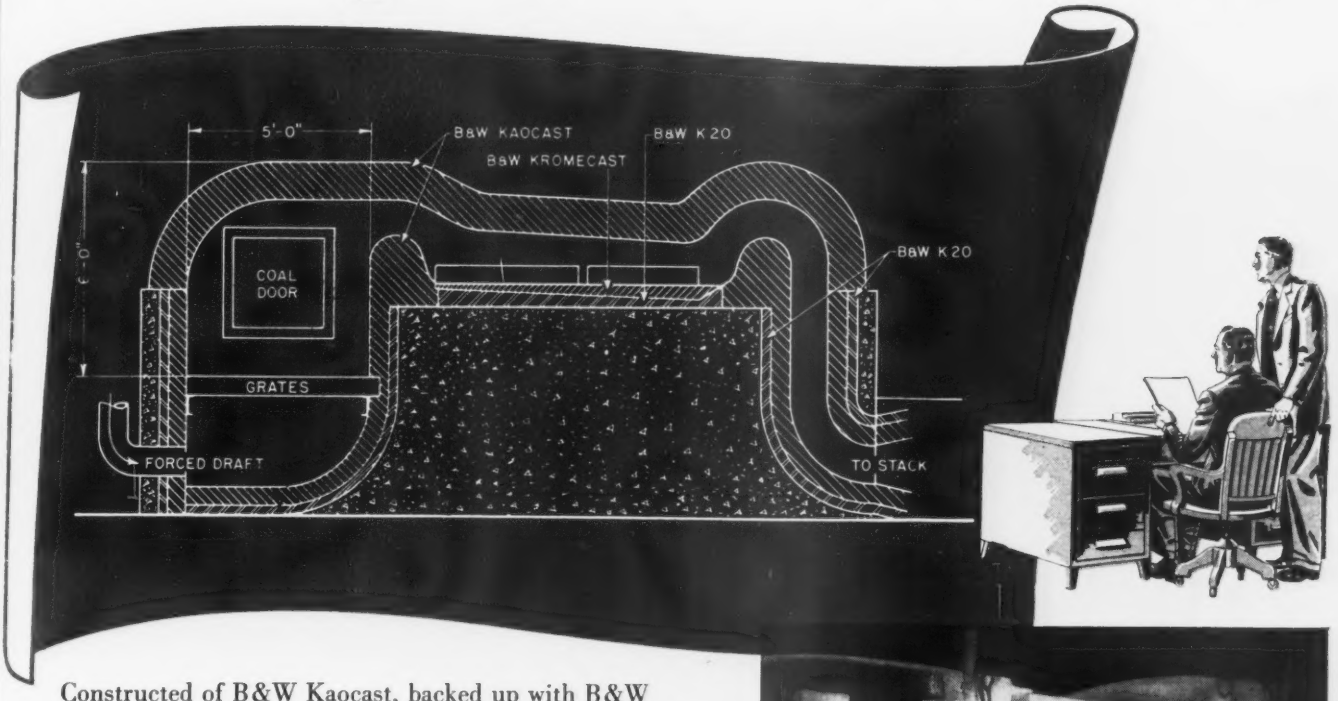
Northwestern Pennsylvania

THREE national officers of the American Foundrymen's Society —President I. R. Wagner, Secretary W. W. Maloney and Technical Director S. C. Massari—were guests at luncheon of Northwestern Pennsyl-

(*Continued on page* 220)

Catawissa Valve & Fittings Company

BUILDS COMPLETE FURNACE *with B&W Refractory Concretes*



Constructed of B&W Kaocast, backed up with B&W K-20 Insulating Concrete-Mix, and with a hearth of B&W Kromecast, this forge furnace had to stand up under these tough "stop-and-go" conditions:

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Quality control was also improved due to the elimination of inclusions in the forged steel products.

There are good reasons for the excellent performance of these B&W Refractory Concretes. Kaocast, a 3000 degree refractory castable, has high resistance to spalling and slag attack. It offers low volume change and negligible reheat shrinkage. Versatile Kaocast can be molded quickly, easily cast directly in place or applied with a cement gun.

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R-45

CINCINNATI Chapter of the AFS heard Jack B. Caine, center, foundry consultant, Cincinnati, discuss foundry sand problems at the Nov. 10 meeting. From left to right are Irving Judd, Standard Castings Co., Cincinnati; William Love, Lunkenheimer Co., Cincinnati; the speaker, Mr. Caine; Henry McFarlin, Henry Wood Co., Cincinnati, and Martin Milligan, Lunkenheimer Co.

(*Continued from page* 218)
vania Chapter of the AFS on Oct. 27. With Fred Carlson, Weil-McLain Co., Erie, chapter chairman, presiding, President Wagner discussed the functions and progress of the national organization.

There was considerable interest in the report on the Safety & Hygiene and Air Pollution program which is now being undertaken by the society. Mr. Wagner also congratulated the chapter on its initiative in promoting its long-range educational program. He believes the sound-slide film produced by the chapter, "A Career in Metal," is an outstanding contribution to the foundry industry.—*Roy A. Loder, Erie Malleable Iron Co.*

Southern California

A RECORD attendance of 250 members and guests were present at the November meeting of Southern California Chapter of the AFS. Dr. H. K. Salzberg, Chemical Division, Borden Co., was introduced by Chapter Vice President Hubert Chappie. He spoke on "Shell Molding."

Dr. Salzberg first showed with slide illustrations various pieces of laboratory equipment used to test resin binders used in the shell molding process. He then outlined the procedure in producing shell molds and cores. Following his talk an open forum period followed during which problems relating to shell molding and core making were discussed.—*K. F. Sheckler, Calmo Engineering Co.*

Cincinnati

A THOUGHT-PROVOKING lecture on foundry sands was presented by Jack B. Caine, foundry consultant, at the Nov. 10 meeting of Cincinnati District Chapter of the AFS. The meeting was attended by 125 of Mr. Caine's fellow chapter members and was held at Suttmillers Restaurant, Dayton, O.

Mr. Caine believes there is much to be learned about foundry sand. The job of sand control is first one of evaluation, then application and finally control of production sands. The problem of evaluation involves making many thousands of tests until specific defects can be produced or eliminated at will from specific castings. Evaluation of this type can reveal that many defects usually associated with sand trouble may be caused by other factors much more influential, such as design, pouring temperature, metal head, etc—*David J. Pusack, Cincinnati Milling Machine Co.*

SOUTHERN CALIFORNIA Chapter of the AFS met in November to hear Dr. H. K. Salzberg, Chemical Division, Borden Co., discuss "Shell Molding." Left to right: Leonard O. Hofstetter, president, Brumley-Donaldson Co., Huntington Park, Calif.; Dr. Salzberg, and chapter vice president and program chairman Hubert Chappie, foundry superintendent, National Supply Co., Torrance, Calif.

Wisconsin

THE 279 members and guests present at the November meeting of Wisconsin Chapter of the AFS divided into five groups for technical sessions following dinner. The meeting was held at Hotel Schroeder, Milwaukee.

The malleable group had as its speaker H. R. Williams, Williams Management Engineering, Milwaukee, who spoke on "Molding, Core Making and Grinding Standards and How They are Applied." B. K. Gapinski, Milwaukee Malleable & Gray Iron Works, acted as chairman.

Nicholas Todoroff, Crane Co., Chicago, and William George, R. Lavin & Sons Co., Chicago, presented a "Scrap Digest," to the nonferrous foundrymen. Chairman for the group was Carl Van Buren, Allis-Chalmers Mfg. Co., Milwaukee. Some members brought problem castings to have the cause of the trouble analyzed during the discussion period.

"Comparison of European and American Foundry Methods" was the subject of a talk by Joseph Gitzen, Delta Oil Products Co., Milwaukee. Clifford W. Schwenn, Brillion Iron Works, was chairman.

Those attending the pattern session heard M. K. Young, U. S. Gypsum Co., Chicago, whose subject was "The Story of Gypsum and Hydrocals in the Pattern Shop." Mr. Young reviewed the history and development, characteristics and applications of plasters, and displayed several models, including the fabrication of a Keller model. He concluded his presentation with a film which showed the making of pressure cast plates and the use of metal casting plasters and high expansion plasters. R. J. Christensen, Wisconsin Pattern Works, was chairman.

"The Effect of Gating Design on Casting Quality" was the subject of

(*Continued on page* 223)

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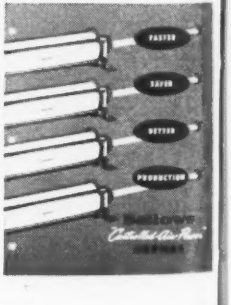

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BELLOWS "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

(*Continued from page* 220)

a talk of S. C. Massari, research director of the American Foundrymen's Society, Chicago, with Erwin G. Tetzlaff, Pelton Steel Casting Co., chairman. Mr. Massari discussed basic gating principles as applied to steel castings. Gating questions then were answered by a panel which included Mr. Tetzlaff; Charles Fuerst, Falk Corp.; Jerome Austin, Wehr Steel Co.; A. M. Herrmann, Racine Steel Casting Co.; and Frank Vogt, Bucyrus-Erie Co.—*John E. Hubel*

Manitoba

AT a recent meeting of the Manitoba Chapter of the American Society for Metals, a talk on gray cast iron was featured. F. W. Kellam, metallurgical engineer with Electro Metallurgical Co. of Canada Ltd., Welland, Ont., was the speaker.

Mr. Kellam first described methods of melting, with special emphasis on cupola melting. He discussed the practices required to produce different grades of iron as well as the effect various alloying elements have on the physical properties of the iron. Mr. Kellam concluded by summing up the properties of gray iron and gave examples of its proper application.—*G. E. Mason, Motor Coach Industries Ltd.*

Quad City

AT the Nov. 17 meeting of Quad-City Chapter of the AFS, T. E. Eagan, Cooper Bessemer Corp., Grove City, Pa., discussed "The Practical Aspect of Nodular Iron." The meeting was held at Fort Armstrong Hotel, Rock Island, Ill.

MANITOBA Chapter of the ASM heard guest speaker F. W. Kellam, metallurgical engineer, Electro Metallurgical Co. of Canada Ltd., speak on gray iron melting practice at a recent dinner meeting. J. Oswald, right, chapter vice chairman, presents Mr. Kellam, left, with a gift

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K-430

CHICAGO Chapter of the AFS sponsored a roundtable November meeting at which nonferrous foundrymen could present their problems for discussion. In the upper view, from left to right, are William L. Rudin, chief engineer, Elesco Smelting Corp., Chicago; E. E. Henry, foundry superintendent, Hammond Brass Co., Hammond, Ind.; and Chester K. Faunt, manager, Christensen & Olsen Foundry, Chicago, who led the nonferrous discussion. Below, some chapter members enjoy the predinner social hour. Photos are by I. H. Dennen, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago

Mr. Eagan described the method of producing nodular iron commercially, the physical properties obtainable, and pointed out that the material fits between high-strength cast iron and cast steel with regard to properties and uses, and will augment malleable iron and pearlitic malleable iron particularly in castings with heavier sections.

Some of the difficulties of production, in addition to the valuable characteristics and uses, were pointed out. F. T. McGuire, manager of the materials engineering department, Deere & Co., served as technical chairman. —*Eric Welander, John Deere Malleable Works*

Chicago

THE WINTER'S first snowstorm notwithstanding, some 210 members and guests put in their appearance for the Dec. 1 meeting of the Chicago Chapter, AFS. Held as usual in the quarters of the Chicago Bar Association, the meeting had strong appeal to foundrymen regardless of metal they cast because it featured showing of the AFS color-sound movie, "Effect of Gating Design on Casting Quality."

Chapter President John H. Owen, Harbison-Walker Refractories Co., presided over the general portion of the meeting. He announced that the annual Ladies Night party would be held on Saturday, Feb. 14. Roy W. Schroeder, assistant professor of foundry and pattern laboratory, Navy Pier Branch, University of Illinois, and chairman of the Chapter's Educational Committee, reported good progress in arrangements for the School of Gating and Risering to be conducted in March. Membership activities were reviewed by Deming H. Lucas, Pittsburgh Metals Purifying Co.

Chapter Vice President John A. Rassenfoss, American Steel Foundries, chairmanned the technical portion of the meeting. He introduced Walter Bonsack, vice president and director of research, Christiansen Corp., Chicago, as narrator of the film. Mr. Bonsack served as chairman of the AFS Aluminum and Magnesium Division—now the Light Metals Division—and is vice chairman of that division's research committee which has directed preparation of this film and its two predecessors.

Inasmuch as the new film is being widely shown and various reviews have been published, it will not be summarized here. Like the two films which have gone before, this presentation demonstrated that properly directed research can throw useful light on foundry procedures. A lively discussion followed the film.

Next Chapter meeting on Jan. 5 will consist of roundtables. Gray Iron Division will deal with "Gating and Risering"; Malleable with "Cores"; and Nonferrous with "Sand." The Steel and Pattern Divisions will convene jointly.—*Erle F. Ross.*

TWIN CITY Chapter of the AFS held a "Student Night" Nov. 11. Among those present were, left to right, Professor Fulton Holtby, University of Minnesota; Fred B. Walls, metallurgist, International Nickel Co.; the speaker of the evening, George K. Dreher, executive director, the Foundry Educational Foundation, Cleveland; and R. C. Wood, vice president Minneapolis Electric Steel Castings Co., Minneapolis. Photographs by courtesy of Robert J. Mulligan, Archer-Daniels-Midland Co., Minneapolis

Twin City

THE Nov. 11 meeting of Twin City Chapter of the AFS was designated "Student Night." Present at the meeting were 44 selected students and apprentices together with their instructors from the various colleges and vocational schools in the Twin City area. R. C. Wood, vice president Minneapolis Electric Steel Castings Co., served as toastmaster and welcomed the guests.

Future plans of the chapter's Educational Committee regarding activities for the students were presented by J. D. Johnson, Archer-Daniels-Midland Co., committee chairman. George K. Dreher, executive director of the Foundry Educational Foundation, was the featured speaker. He was introduced by O. J. Myers, technical director of Foundry Products Division, Archer-Daniels-Midland Co. Mr. Dreher emphasized the importance of education in

(*Continued on page* 226)

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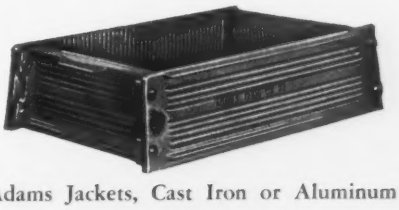

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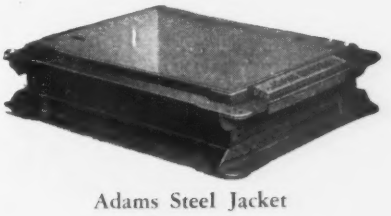

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Phenolic Resins that fit the job

(*Continued from page 224*)

giving a man greater potential value to his employer by increasing his ability to profit from his experiences in the business world. He backed up these claims with some enlightening facts about the number of young men who do not pursue their education beyond the elementary level and their probable degree of success in the future.

First of the plant visits arranged by the Educational Committee for the students was held Nov. 25 at Minneapolis Electric Steel Castings Co. Carter DeLaittre, foundry superintendent and Carl W. Sundberg, assistant metallurgist, served as hosts.—*R. J. Mulligan, Archer-Daniels-Midland Co.*

Detroit

PLANT personnel relations at the foreman and supervisory level were discussed by Edward McFaul in a talk entitled "What's Your Washroom Rating" at the Nov. 20 meeting of Detroit Chapter of the AFS. The meeting was held at the Detroit Leland Hotel and 100 members and guests were present. Vaughan C. Reid, City Pattern Foundry & Machine Co., Detroit, retiring chairman, presented the gavel of chairmanship to Michael Warchol, Atlas Foundry Co., Detroit.

Mr. McFaul said that the most important duty of the foreman is to know how to communicate with the worker. The speaker also cited examples of the fact that there is no logic to the emotions of the worker. He added that workers must have confidence in the leader and they also deserve recognition from that leader.

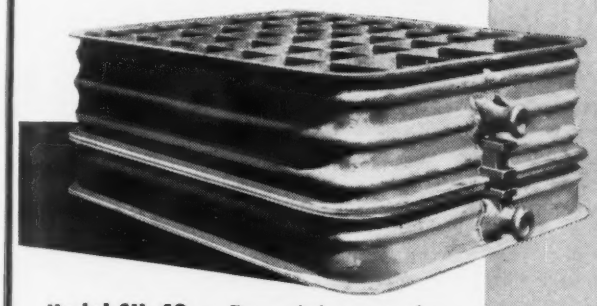
A new program of special events "for members only" was inaugurated by the Detroit Chapter, Dec. 5, when it held a stag "Christmas Millionaires Party." Locale was Detroit's Belle Isle Casino where games of "skill"—ranging from roulette to craps—were conducted. Each player was presented a bundle of stage money as he entered the Casino. At the end of the evening 28 prizes were auctioned off to the lucky gamblers who had managed to beat the house's games and still had stage money left.

The dinner and prizes were provided by companies which joined with the chapter to play host for the affair. About 212 AFS members turned out. In recognition of the party's success, the chapter is contemplating a number of special events and field trips to be limited to members.—*Walter P. Kantzler, Kelsey-Hayes Wheel Co., and H. C. Tuttle*

Now...Specify

Republic

STEEL FOUNDRY FLASKS



Model CH-40... Extremely large crane handling flask for extra heavy duty. Has intricate barring arrangement. Double bearing welded pin lugs on cope; single bearing welded pin lugs on drag. Extra heavy duty trunnions securely welded.

Model OM-4 ... Especially adapted to fast production machine molding. One man can handle. Equipped with "D" type handles, welded or riveted, and single bearing welded pin lugs. Malleable riveted pin lugs furnished on request.

Model TM-11... Medium weight flask for two-man handling. Equipped with single bearing welded pin lugs on cope, and double bearing welded pin lugs on drag. Timesavers in handling, ramming and shaking out.

THEY'RE the same high-quality steel flasks you've always known and used under the "Truscon" name. Now, they have a new name: "REPUBLIC".

Each Republic Steel flask is designed and built to the needs of its job. Each has the extra strength and rigidity needed to take the heavy day-after-day punishment of foundry service.

Republic flask walls are of proper thickness. Flanges are correctly placed. Ribs and flanges extend full depth around the entire flask. Every cope, drag and check is one integral piece of tough steel. There are no built-up sections to jar loose.

Nothing is changed but the name. Every detail is given the same close attention it always has received in Republic's efficient Pressed Steel manufacturing plant.

Republic Steel flasks are backed by many years of experience in this specialized production. Write for free illustrated literature.

PRESSED STEEL DIVISION
REPUBLIC STEEL CORPORATION
6208 Truscon Avenue • Cleveland 27, Ohio

Republic

REPUBLIC STEEL

STEEL FOUNDRY FLASKS

Now . . . Seams Reduced to **ABSOLUTE MINIMUM** on these NEW AO Gloves!

HAND PROTECTION

AO 514 ASBESTOS GLOVE

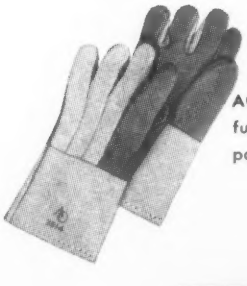
Yes, for workers' comfort . . . for savings for our customers, we've redesigned our asbestos glove line to eliminate seams wherever possible. By reducing seams from 8 to 3, there's not only greater working ease for the user but longer work life for the glove.

MAKE THIS COMPARISON TEST!

Look at any conventional asbestos glove. Note the vertical seams that extend to the cuff. Note the seams that secure gauntlet to glove. Now check against the large photograph here. You'll see the seams on the thumb and only ONE SEAM extending the length of the glove (on the back). Note also the absence of horizontal seams—(thus assuring a stronger glove and longer life which means valuable savings).

AO 1514 Glove with leather-reinforced palm.

AO 2514 Glove with asbestos-reinforced palm.



AO 3514 Glove with full leather-reinforced palm and finger area.

QUICK FACTS:

- Finest grade specially treated asbestos, recommended for extreme heat.
- Yarn is closely woven.
- Double stitched for long service.

AO's Industrial Vision Program increases production, decreases accidents. Write today for free booklet "Improved Industrial Vision" to 1113 Vision Park, Southbridge, Massachusetts.

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Good Cost Methods

(*Continued from page* 111)

before arrival at the "estimated selling price."

Selling Price—The estimated selling price is the sum of the total cost after the addition of allowance for defectives, profit, pattern cost, metal cost in good castings, delivery cost and extras.

The selling price obtained is recorded on the estimate sheet.

The "cost per piece" for each cost element and selling price is arrived at by dividing the total cost of the elements by the number of castings in the job ("pieces").

The "cost per pound" for each cost element and selling price is arrived at by dividing the total cost of the elements by the weight of good castings in the job.

The "estimate sheet" presented here is suggested for both jobbing and so-called production foundries where no unusual operating conditions prevail. If unusual operating conditions do prevail, estimate sheets should be designed and used to cover such conditions, adhering to the cost fundamentals and procedures set forth in this presentation.

When the customer's order has been received, the estimate sheet may be placed in a multiple-ring book pending the recording of actual production of the job.

A similar form (Fig. 5) is used to record the actual cost of the job. The completed record is superimposed on the estimate sheet in the book in such a manner that the cost-per-pound columns of the two sheets are visible. Should it be desired, superimposement may be such that both costs per piece and per pound are visible. This procedure provides a valuable means of comparison.

Actual costs may be recorded for the entire job, by accounting period and as occasional tests.

Over a period of years FOUNDRY has published a number of articles dealing with cost accounting for foundry operations. The main object of those articles has been to show the undependability of commonly employed cost procedures based on averages. The following are the most dangerous:

1. Disregard for variances in yield of good castings when the cost of metals in individual jobs is calculated.
2. Application of all elements of overhead costs for coremaking and molding to jobs on the basis of direct labor dollars.
3. Use of tonnage as a basis for cleaning cost calculations.

Yield in good castings is influenced by the shapes and sizes of castings and the manner in which molds are set up. Since there is no consistent uniformity in the yields of good castings among the jobs produced in a foundry, recognition must be given that fact during the compilation of costs to be used in the establishment of sensible sales policies.

Because there is no relationship between the costs of coremaking and molding jobs of different shapes and sizes and the hourly costs of maintaining and operating processing facilities, the practice of allocating overhead on the basis of direct labor dollars usually results in extremely unreliable job costs. For instance:

(a) A complicated set of cores for a specific job may require a $2-an-hour coremaker, whereas a simple core can be made by a coremaker paid $1 an hour. The cost per hour of furnishing operating facilities is usually the same. Therefore, allocating overhead on the basis of direct labor dollars can only produce inaccurate results.

(b) Similarly, an experienced $2.50

(*Continued on page* 231)

PARASPRAY
SAVES LABOR — CUTS REJECTS
LOWER COSTS — BETTER CASTINGS — MORE CUSTOMERS
THE MODERN MOISTUREPROOF CORE AND MOLD SURFACE CONDITIONER FOR
GREEN OR DRY SAND CORES & MOLDS — MATCHPLATES — CHILLS INSERTS AND SPRUES

PARASPRAY is a scientifically prepared, ready-to-use, fast-drying, liquid chemical formulation designed for easy and quick application to molds, cores, chills and inserts by spraygun, dipping or brush.

Advantages of Paraspray

- Makes smoother castings and saves cleaning labor.
- Reduces blows, kicks, rat-tails and surface defects.
- Stabilizes moisture content.
- No baking—no torching.
- Allows rougher handling.
- Cuts porosity and gas hole losses—denser castings.
- Produces hard, dry moisture-proof surfaces with uniform strength.
- Permits storage without absorption or loss.
- Prevents surface oxidation.

Why Paraspray Is Different

- PARASPRAY, basically a waterproof cement, quickly and tightly *BINDS* together loose grains of sand on the surface of cores and molds.
- PARASPRAY fills a necessary requirement in *MOLD ATMOSPHERE CONTROL*. It completely gasifies at about 400°F. leaving a thin film of amorphous carbon. The inert gas formed replaces *AIR* in mold cavity, providing *A DE-OXIDIZED ATMOSPHERE* which prevents oxidation of surface of molten metal.
- PARASPRAY provides complete moisture control. *A PARASPRAY* film on surface of core or mold, *PREVENTS MOISTURE* absorption or loss from molds in green sand work; especially where synthetic sands are used.
- PARASPRAY is the ideal carrier for graphite, silica, mica, zircon flour and other materials used as core and mold surfacing agents to produce smoother castings.

WRITE DEPT. F11 FOR LITERATURE

Also ask about PARACOAT for patterns and coreboxes and BONISPRAY, the permanent mold and die dressing.

Para Products Have A Place in Every Foundry

PARASPRAY PARACOAT BONISPRAY

FOUNDRY RUBBER INCORPORATED

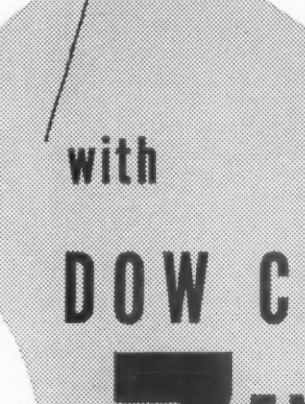
4914 Bethesda Ave., Bethesda, Maryland
Phone: OLiver 1022

SPEED SHELL MOLDING

Mr. Ray Sutter at the single-station control panel of the SP-100 sand shell molding machine, made by Sutter Products, Dearborn, Michigan. The Sutter SP-100 is one of the first machines to provide a completely automatic molding cycle including closely controlled coating, temperature and curing time. Maximum shell capacity is 20" x 30" x 6"; production rate 45 to 60 shells per hour. Gasfired, electric curing oven optional.

with

DOW CORNING 7 EMULSION



. . . the silicone release agent that gives you clean, automatic release of sand shell molds and cores; assures fast, continuous production.

As the process for making sand shells becomes more completely automatic, Dow Corning 7 Emulsion becomes increasingly important. Effective as a release agent in hand-operated equipment, this noncorrosive, nonflammable silicone emulsion is essential to the efficient operation of high speed, automatic machines like the shell-a-minute Sutter, shown above.

Dow Corning 7 Emulsion is sprayed to cover even the most complex patterns with a very thin silicone film that gives fast, easy release. And that silicone film will not break down at curing temperatures to leave a carbonaceous deposit on the patterns. Your patterns, therefore, stay clean longer and you get shell molds with uniformly high dimensional accuracy.

Dow Corning 7 Emulsion can be quickly diluted with water to give you any concentration you may require. Try it yourself and see why the largest operators as well as the pioneers in sand shell molding techniques use Dow Corning silicone release agents.

Send for trial sample TODAY.

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Midland, Mich.

Please send me
- ☐ Free sample of Dow Corning 7 Emulsion
- ☐ Data on Silicone Release Agents for the Shell Process

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DOW CORNING SILICONES

ATLANTA CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

In Canada: Fiberglas Canada Ltd., Toronto In Great Britain: Midland Silicones Ltd., London

(*Continued from page* 229)

operator may be required to mold a lot of 100-lb castings of unusually intricate design, and an inexperienced $1.50 operator may mold a lot of 100-lb castings of simple design.

Because each molder requires the same space and molding facilities, which cost approximately the same per hour, allocation of overhead on the basis of direct labor dollars would grossly overstate the cost of the intricate job and materially understate the cost of the simple job. As a result, the cost of these two jobs would both be inaccurate perhaps to the extent of influencing management to price its company out of business on the intricate jobs and accepting unprofitable jobs of the simple design.

The same inaccuracies could occur where a molder, at the same wage rate, molds an intricate job one day and an easy one the next day, the ratios of piece or weight are related to time rather than direct labor cost.

(c) Some foundrymen allocate the cost of cleaning castings on the basis of weight. The fact is that there is usually no relationship between the time required to clean a casting and its weight. Therefore, cleaning costs should be calculated on the basis of time rather than of weight.

Some foundrymen accept the theory that there is a universal relationship between the cost of cleaning all castings and that of the molding labor, or, in some instances, between the combined coremaking and molding labor costs, and allocate cleaning cost accordingly. This theory has no foundation, and the allocation of cleaning costs thereby can only result in false, unreliable job costs.

The purpose of the foregoing has been to stimulate intelligent thinking about cost accounting fundamentals and procedures essential for the establishment of profitable sales policies formulated to tell foundry management when to accept and when to refuse business.

Procedures are often established which are adequate for the needs of the business, but which in practice either are never carried out or gradually break down over a period of time. It is important, therefore, that new procedures be consistently followed up and tested before they are abandoned.

The executives of any foundry, entrusted with the management of its affairs, must protect the interest of the stockholders by seeing that a dependable basis for the establishment of sales policies is provided. This can be accomplished if every element of cost is analyzed and proper costs determined.

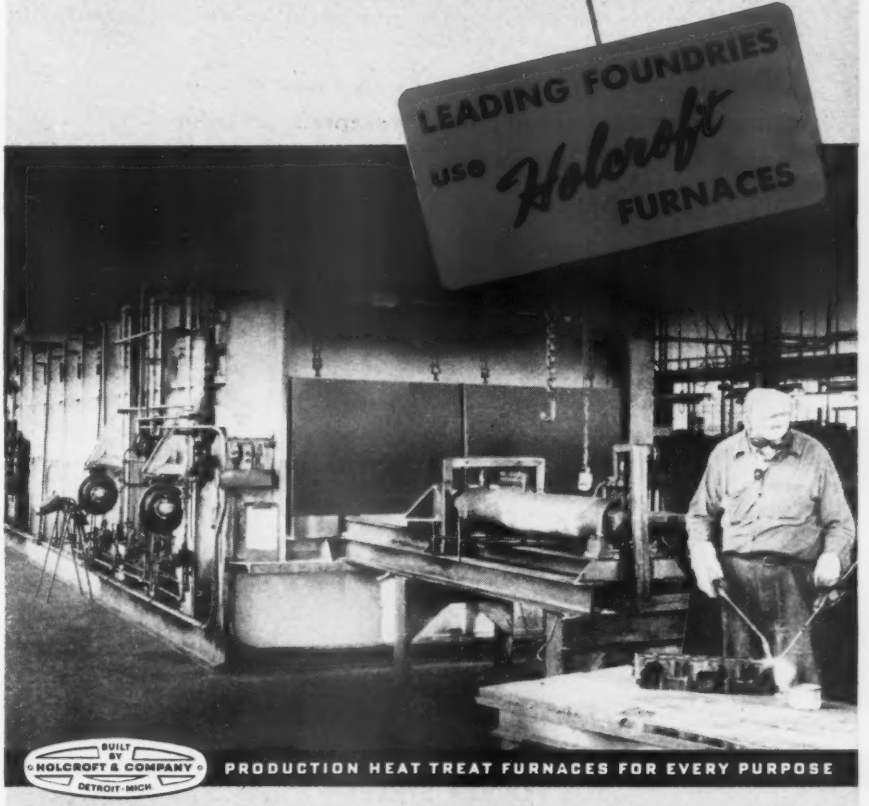
Heat treating welded cracked castings has been simplified by this Holcroft "salvage" annealing furnace.

Due to a unique construction feature within the furnace—hot, annealed castings actually pre-heat cold ones entering the furnace.

It is due to such advancements in efficient furnace operation that substantial savings in fuel are realized by owners of Holcroft furnaces. If Holcroft furnaces *do* cost a little more—savings in fuel and extra efficiency soon start paying dividends to the user.

Leading industries throughout the country today look to Holcroft for such modern techniques in their foundry procedures. They know that Holcroft since 1916 has been the heat treat leader.

You, too, can take advantage of this furnace and heat treat experience. We appreciate your inquiries. Holcroft and Company, 6545 Epworth Blvd., Detroit 10, Michigan.



BUILT BY HOLCROFT & COMPANY DETROIT · MICH

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO 9 — C. H. Martin, A. A. Engelhardt, 4209 South Western Blvd.
CLEVELAND 15 — Wallace F. Schott, 1900 Euclid Ave.
HOUSTON 1 — R. E. McArdle, 5724 Navigation Blvd.
CANADA — Walker Metal Products, Ltd., Windsor, Ontario
EUROPE — S. O. F. I. M., Paris 8, France

DESIGN
FABRICATION
INSTALLATION

"for all three call K&B!"

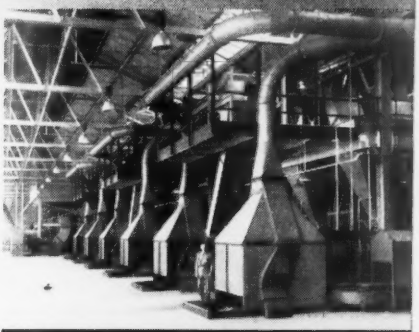
For 45 years, Kirk & Blum has specialized in the DESIGN, FABRICATION and INSTALLATION of efficient, dependable systems for the removal of dust and fumes.

DESIGN: Kirk & Blum engineering specialists survey your plant and then design your system, selecting equipment most suitable for your problem.

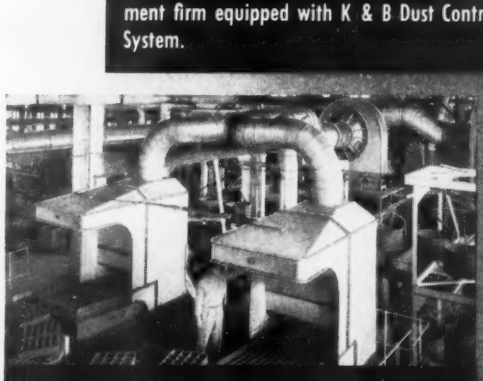
CONSTRUCTION: Kirk & Blum fabricates the complete system (equipment excepted), "tailor made" for your installation.

INSTALLATION: The Kirk & Blum contract includes responsibility for the entire system, installed by mechanics with years of specialized experience in the installation of such systems. As a result, you have one undivided responsibility —one complete contract for an installed system, ready to operate.

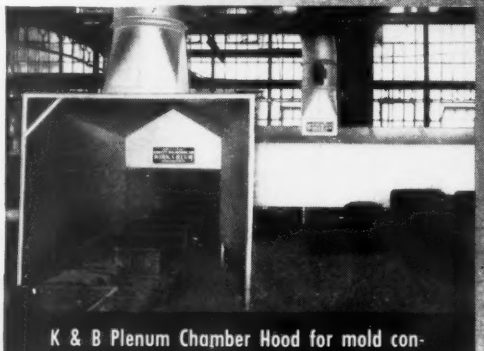
View in new Southern Foundry, shows pouring station with K & B system which removes smoke and fumes as they are formed.



"Shakeouts" in the foundry of a noted implement firm equipped with K & B Dust Control System.



Another K & B system for production line shakeouts. Note that Dust Control equipment does not interfere with production.



K & B Plenum Chamber Hood for mold conveyor operation. Note bolted section construction for ease of maintenance.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

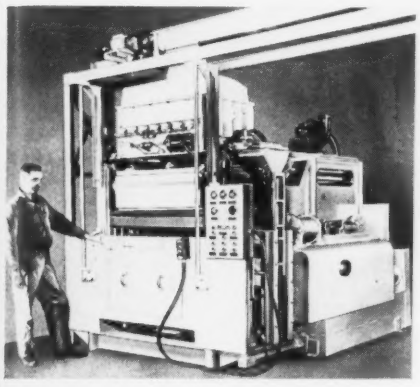
KIRK AND BLUM

DUST AND FUME CONTROL SYSTEMS

THE KIRK & BLUM MFG. COMPANY
3108 FORRER STREET
CINCINNATI 9, OHIO

SPO Inc. To Manufacture Shellmold Co. Machines

SPO Inc., Cleveland, and Shellmold & Machine Co., New York, have completed an agreement under which SPO's manufacturing and distribution facilities will become available to Shellmold & Machine Co. for the production and distribution of Shellmold's complete line of shell molding machinery and auxiliary equipment.



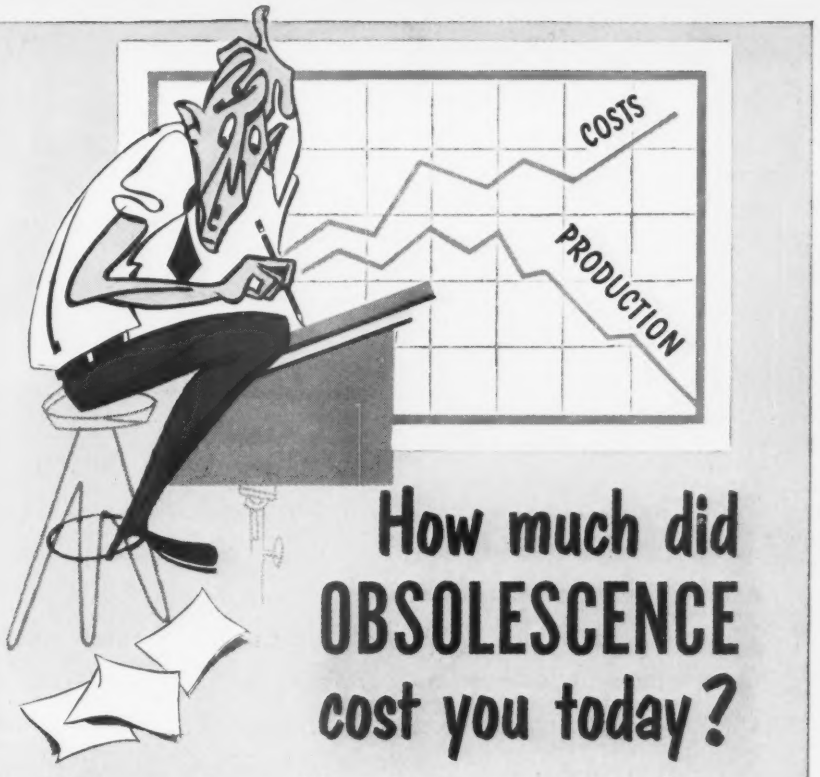
Included in the agreement is the automatic Type SU-1 shell mold machine, a single station unit already in use in foundries producing a variety of castings for the automotive, farm implement and aircraft industries. Also covered are new hand and air-operated shell mold units developed to meet the average foundry's need for a production unit scaled to operational requirements. One of these models is shown here.

Other equipment to be handled by SPO includes an automatic-metering sand-resin-mix recharge feeder and machines for blending, mold removal and mold closing.

FEF Issues Chart Showing Educational Facilities

Foundry Educational Foundation, Terminal Tower Bldg., Cleveland 13, has published a chart showing the research and technical service abilities available at each of the 14 colleges and universities in the FEF program.

The foundation points out that although the chart will serve as a useful guide, some judgment is required in its use. Each of the institutions concerned includes from 25 to 200 men covering all fields of science and engineering technology who can be drawn into almost any problem or idea which conceivably could confront a metal casting company. Consequently the abilities of the schools are not restricted to instructors in the foundry field only.



How much did OBSOLESCENCE cost you today?

The fastest way for a machine to become obsolete is for someone to develop a new machine to do the same job faster, better, and more economically.

Look at it this way. Say you operate a machine tool that turns out 50 work units an hour. If your competitor installed a 100-unit-per-hour machine at a price comparable to yours, his competitive unit cost would give you trouble. In effect, the minute he went into production, your machine became obsolete.

When it comes to constant efforts to improve our product, CLARK pleads guilty. The quality fork truck that you bought some years ago may be secretly (to you) suffering from obsolescence, even though it is still doing the job you bought it for. It's not hard to recognize obsolescence when it shows up in high maintenance costs and repair bills. But that's only going skin-deep. The important thing to know is this: how much faster, how much better and at how great a savings can you do the same job with today's CLARK trucks.

New CLARK Trucks to replace your obsolete equipment will step up production and cut service charges so drastically that they'll soon pay for themselves.

How much did obsolescent handling equipment cost you today? You owe it to yourself to know—and then to capitalize on that knowledge by calling in your nearby CLARK Dealer. He'll help you set up a *profitable* modernization program.

1903 1953
FIRST FIFTY YEARS
CLARK EQUIPMENT

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

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☐ Have Representative Call.

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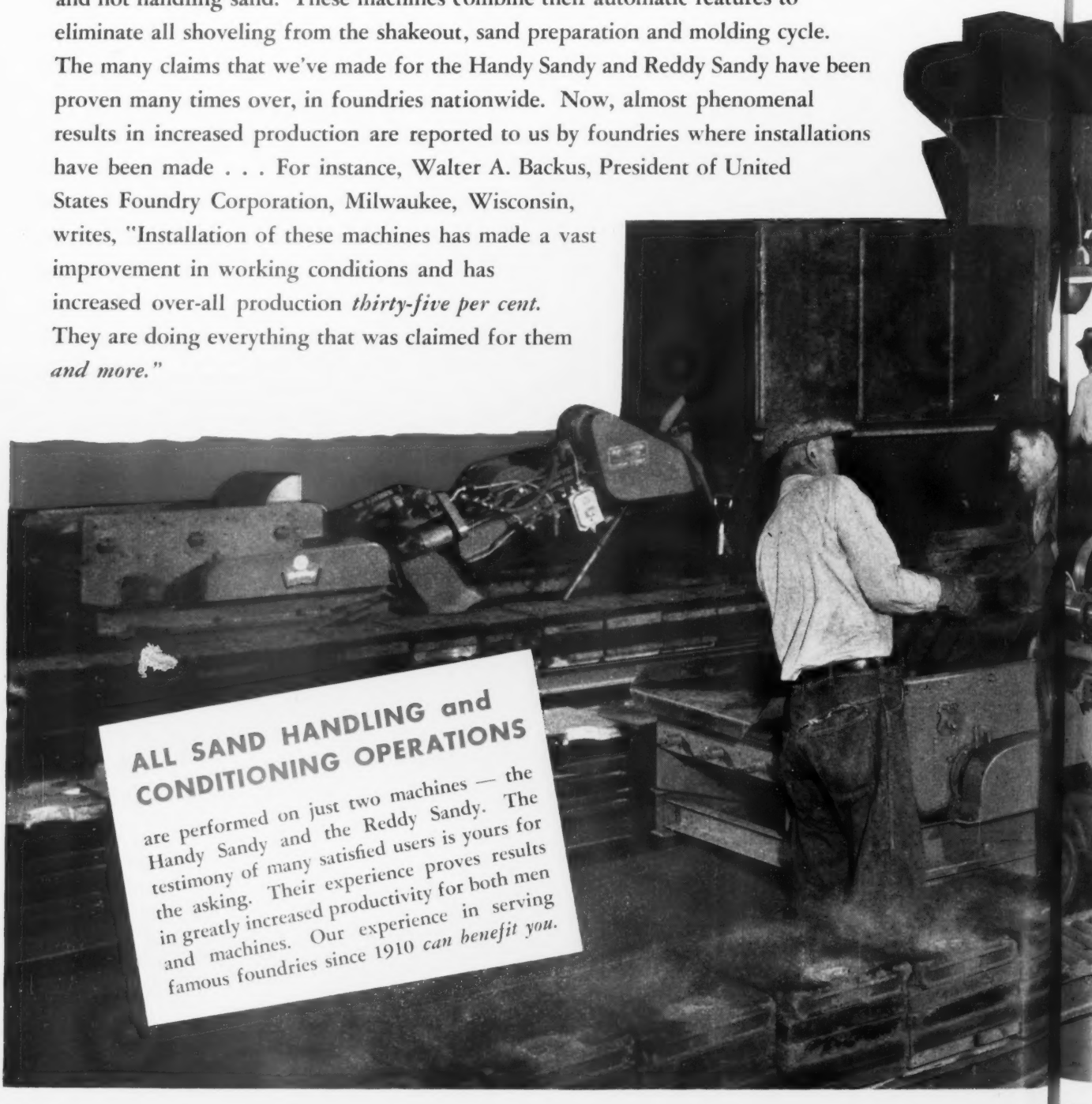
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Handy Sandy and

"do everything that's

With Handy Sandy and Reddy Sandy, molders spend *all their time making molds* and not handling sand. These machines combine their automatic features to eliminate all shoveling from the shakeout, sand preparation and molding cycle. The many claims that we've made for the Handy Sandy and Reddy Sandy have been proven many times over, in foundries nationwide. Now, almost phenomenal results in increased production are reported to us by foundries where installations have been made . . . For instance, Walter A. Backus, President of United States Foundry Corporation, Milwaukee, Wisconsin, writes, "Installation of these machines has made a vast improvement in working conditions and has increased over-all production *thirty-five per cent.* They are doing everything that was claimed for them *and more."*



ALL SAND HANDLING and CONDITIONING OPERATIONS

are performed on just two machines — the Handy Sandy and the Reddy Sandy. The testimony of many satisfied users is yours for the asking. Their experience proves results in greatly increased productivity for both men and machines. Our experience in serving famous foundries since 1910 *can benefit you.*

dReddy Sandy

t'slaimed for them and more"

get the facts today!

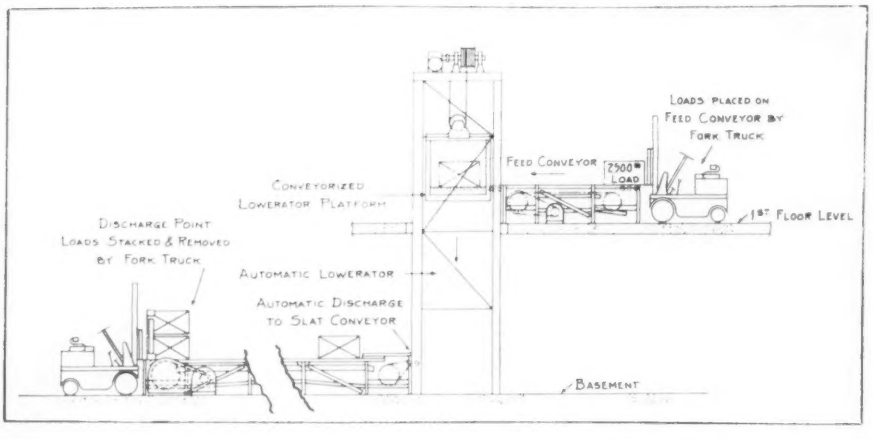
Write for your copy of the Newaygo Catalog: "Planned Mechanization For Foundries"

NEWAYGO | **ENGINEERING COMPANY**

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

NEWAYGO, MICHIGAN

New EQUIPMENT and



Lowerator-Conveyor: Gifford-Wood Co., Hudson, N. Y.—Automatic lowerator-conveyor system is particularly applicable where fairly large quantities of materials must be transported between floors with relative frequency. It can release elevators and fork trucks for other work, relieve plant traffic conditions and cut work hours, according to manufacturer. Three major units comprise the system: The lowerator, a feeding conveyor and a take-off conveyor. All three units are interlocked and controlled by electric eyes and limit switches so that when the feeder conveyor receives a load, it automatically delivers it to the lowerator. That unit automatically descends and delivers the load to the take-off conveyor, from which it is removed for storage or other disposition. The units are constructed according to individual requirements, and can operate in either or both directions.

For More Details Circle No. 1—Page 239

Oil Burner: Bloom Engineering Co., 857 West North Ave., Pittsburgh 33—Oil burner is said to provide flows low enough to prevent overriding of temperature, yet keep burners lighted; permit wide range turndown where wide range of fuel input is required; eliminate intricate adjustments on individual burners and eliminate need for a separate source of high-pressure air for atomizing fuel oil. Burner has a minimum flow of less than ½ gph and a turndown of over 10 to 1. It is controlled through simple adjustment of the fuel supply valve. Manufacturer recommends it for use in forge, continuous and batch-type heating, heat treating and other types of furnaces where small capacity burners are desired. It employs atomizing air at 16 oz and offers equal flame characteristics with either oil or gas.

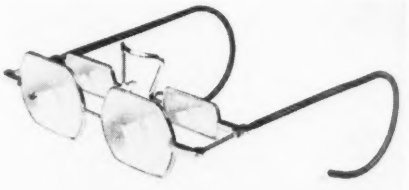
For More Details Circle No. 2—Page 239

Dust Collectors: Dallow Lambert & Co., Spalding St., Leicester, England—Dust collector is said to control effectively almost every type of dust produced by the widest possible range of machines and processes. It can be supplied with any of five different standard fans and motors, two standard filter assemblies and four different standard dust stor-

age containers. This flexibility means that applications requiring a large air volume but producing little dust can be dealt with as effectively as those in which the air requirement is small and the dust load heavy. Light, bulky dusts can be handled as easily as heavy, concentrated dusts. Each unit is provided with quickly released bins of different sizes to suit varying densities of dust. Handles facilitate easy removal without spillage. Standard units are available now with fan capacities from 175 to 2000 cfm, powered by motors from ⅓ to 2½ hp.

For More Details Circle No. 3—Page 239

Magnifying Spectacles: Armco Mercantile Co., 221 North La Salle St., Room 127, Chicago 1—Magnifying spectacles for careful inspection requiring magnification or for close



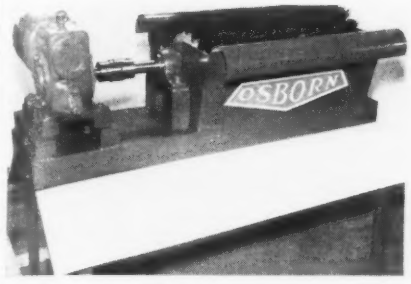
tolerance work that ordinarily strains the eyes employ the same optical system as binoculars or telescopes. With both hands free, an operator can view an area as large as a magazine page, from normal reading distance, without hunching. They afford clear 2x magnification, weigh slightly more than ordinary spectacles, over which they can be worn, and fold down for carrying in their case.

For More Details Circle No. 4—Page 239

Power Brushes: Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14—Conveyor belt cleaning unit consists of a special brush 12 in. in diam mounted in bearings and coupled to a gear head motor that is built on a channel base with an opening under the brush to carry away for reclamation the material cleaned from the conveyor. If belts are not cleaned, adhering load material may be transferred to return rolls causing excessive belt wear through abrasion and reverse belt flexing. The power brush is designed to clean the belt continuously, obviating the need for shutting down a conveyor for hand cleaning. Unit is fastened into place and plugged into a power source.

SUPPLIES

For More Details on these Items
Use Reply Card—Page 239



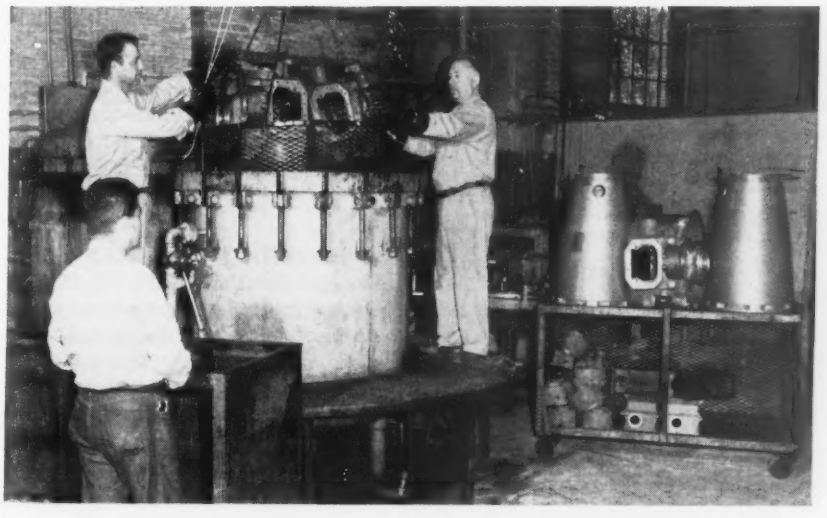
There are no bearings to mount in-line, no alignment of sheaves and similar operations.
For More Details Circle No. 5—Page 239

Cutting Attachment: Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Torch cutting attachment cuts steel and other metals up to 8 in. thick. Available in two models, for different welding blowpipes, each of which offers 23 nozzles for all types of cutting. All fit in place as easily as welding heads. They are intended for general purpose cutting ordinarily. Increased capacity for oxygen delivery and an improved mixer permit the use of greater volumes of oxygen at lower operating pressures. Oxygen at 55 psi cuts steel 4 in. thick, and 100 psi is required to cut steel 8 in. thick.
For More Details Circle No. 6—Page 239

Safety Switch: Trumbull Electric Dept., General Electric Co., Plainsville, N. J.—Company's line of 30, 60 and 100 amp safety switches has been augmented by a 200-amp, 600-v, fusible and no-fuse, front-operated, high-capacity interrupter safety switch. A felt gasket to block dust and dirt is new standard equipment. Outstanding characteristic of the switch is its ability to interrupt heavy loads quickly and cleanly. Its arc-quenching action is patterned after the arc-interrupting principle of modern circuit breakers. Grid pins break up the arc, divide it into a series of smaller arcs and dissipate the heat so that contacts do not pit, thereby increasing life expectancy of the switch.
For More Details Circle No. 7—Page 239

Plastic Fillet: Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11—Plastic fillet for use in patternmaking conforms to almost any shape or surface normally encountered in patternmaking. Fingertip pressure or

Impregnating Resin Said to End Microporosity



NEW combination of sealing materials and impregnation methods is said to make possible 100 per cent "filling" of microporous voids in metallic castings. The process is based on the use of a specially formulated thermosetting resin (that is, one which is infusible on reheating). All of the sealant is said to convert into a solid of good physical and chemical properties, so that when the liquid resin has filled all of the pores, it occupies the same volume after it becomes solid.

The impregnating resin is resistant to many solvents, including water, salts, hydrocarbons, glycols, acids and weak alkalies, and can withstand continuous exposure to temperatures up to 350° F. Although hard, it is resilient enough to allow for expansion and contraction of the metal due to variations in temperature.

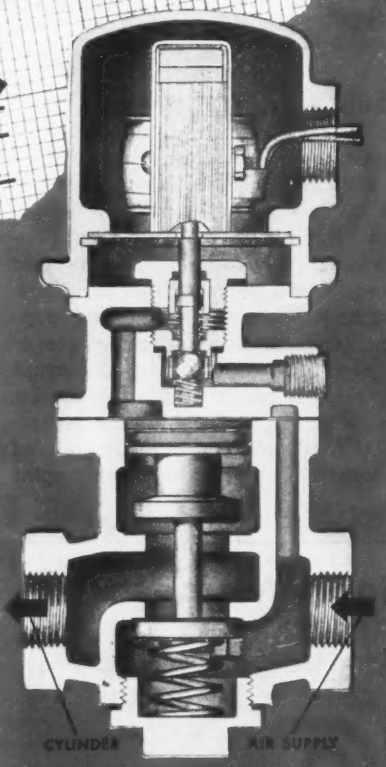
Castings are placed in a vacuum pressure tank. When the tank has been closed and a minimum vacuum of 29 in. (mercury) applied, the sealant is brought into the tank to cover the castings, and 100 psi of air pressure is applied to the fluid head to force the sealant into all microporous areas. After impregnation, the castings are removed, as shown above, their surfaces are cleaned, and they are put into an oven to be cured. No surface stain or film is left by the process, it is claimed. Known as Polyplastex MC, the resin is a product of Polyplastex International Inc., 441 Madison Ave., New York.
For More Details Circle No. 8—Page 239

IF IT'S A VALVE
FOR FOUNDRY WORK—
ROSS HAS IT

with Ross Full-Flo In-Line Valve you get Full Pipe Capacity!

THIS

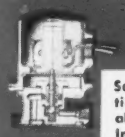
NOT THIS



- Full Line Capacity
- Positive Seal
- High Speed Operation
- Low First Cost
- Low Operating Cost
- Low Maintenance Cost
- Over 500 Straightway and 3-Way Models in ¼"—1¼" Sizes

Ask Ross for Any Air Control Information

Ross makes valves only—hundreds of types and sizes. Take advantage of the experience gained in over a quarter century of concentration on control and application of air power!



Solenoid-Pilot Sections interchangeable on all 24 Ross-In-Line Bodies.

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THE BRIDLE FOR AIR HORSEPOWER

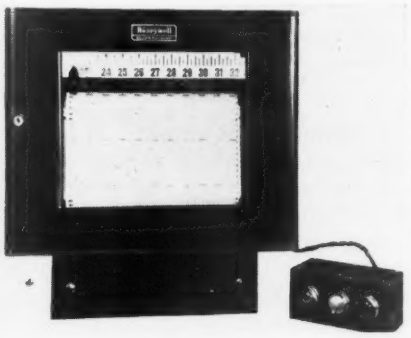
ROSS OPERATING VALVE CO.
120 E. GOLDEN GATE AVE., DETROIT 3, MICHIGAN

Engineers at Your Service in all Principal Cities

use of a fillet tool is all that is required to attach the fillet permanently to wood or metal patterns and coreboxes. Made to precision dimensions, it has knifelike edges; is impervious to moisture, core oils and liquid partings; can be coated with shellac, lacquer or any other recognized pattern coating; is durable; does not dry out and maintains its dimensions under any conditions usually encountered in foundry practice. Waterproof cement with which it must be applied and a solvent for the cement are also available from the manufacturer in quart containers.

For More Details Circle No. 9—Page 239

Metal Temperature: Minneapolis-Honeywell Regulator Co., Brown Instrument Division, Wayne & Windrim Aves., Philadelphia 44—Electronic detecting device is said to reduce cost and increase accuracy in measuring molten steel temperatures. Fast-acting thermocouples are immersed in the steel for a minimum of time, thereby extending the life of the unit. Immersed, the unit signals the operator at the precise moment the maximum, or true, reading is obtained, avoiding guesswork and eliminating the possibility of destroying the expensive platinum thermocouple. A proper reading can be obtained in about 10 seconds, it is claimed.



For More Details Circle No. 10—Page 239

Insulating Firebrick: Zonolite Co., 135 South LaSalle St., Chicago—Insulating firebrick made of vermiculite and clay binders is said to possess extremely low thermal conductivity and to prevent excess heat loss in constant or intermittent furnace operations. Bricks have high resistance to cracking, good physical and chemical stability, and are easily sawed and fitted. Designed primarily as backup insulation for refractory brick in the service range up to 1800° F, the firebrick can be used as facing brick when temperatures are not higher than 1800° F and there is no mechanical abrasion or exposure to molten slag or metal. Physical properties are: Density, 35

(*Continued on page* 241)

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

51. Core Oils

E. F. Houghton & Co.—You get your suits tailor-made, so why not get your core oils the same way? Logical, isn't it? Here is a 4-page illustrated folder that tells all about Hy-Ten 300 series core oils—what they are, how they work, why they are better. Sew, you'd better get it, needles to say.

52. Jolt Strippers

Spo, Inc., Milwaukee Foundry Equipment Div. — Advantages, construction features, illustrations, specifications, etc., can be found in bulletin No. 110-A on Milwaukee jolt squeeze pin strippers. Four pages, but packed.

53. Sand Core Dryer

Allis-Chalmers Mfg. Co. — If the answers to these questions is "Yes", then you win a copy of an 8-page brochure (15B7306B) on Foundromatic dielectric sand core dryer. Do you want to make better cores in less time at lower cost? Do you want the inside story of this dryer? And all the Specs? Plus other data?

54. Handling Systems

Service Caster & Truck Corp. — Your ticket to low cost handling is Service material handling systems, says 4-page folder which illustrates and briefly describes line of hand trucks, lifters, pallet trucks, load levelers and fork lift trucks and casters.

55. Band Saws

Johnson Mfg. Corp.—Climb on the Johnson band (saw) wagon with either a model J or model B band saw, both described in 4-page folder. Former handles 10-in. rounds and up to 18-in. flats, while latter model features a 5 x 10-in. throat capacity and that's not for gargling, either. Model J, which uses a coolant, also boasts a drip pan and removable drawer for quick cleaning.

56. Explosionproof Valve

Bellows Co.—In 4 pages, bulletin AVX-310 gives you the dope on the explosionproof Electroaire valve, an electrically controlled four-way directional air valve. And in Foto Facts File FF47-739 you'll see and read about typical installation of pneumatic devices in large and small foundries.

57. Boy, What Ladles

Industrial Equipment Co. — Boy, never saw so many ladles. You can see 'em, too, if you send for illustrated catalog No. 35. It covers many, many types, sizes and shapes —in fact, there is one to suit every need. Very complete specifications and construction details are given. Boy!

58. Handling Hot Rod

Koehring Corp. Kwik-Mix Div.—The lowly wheelbarrow has been mechanized and named the Moto-Bug. Powered by 6-hp air-cooled gasoline engine, this versatile materials handler is offered with 10-cu ft hopper, 1500-lb capacity platform, 1000-lb hydraulic powered fork lift or 5-ft scraper blade. Its uses are shown in 4-page bulletin KM328.

59. Core Binders

United Oil Mfg. Co.—Just in case you missed those excellent guides to proper core binding in this company's ads in FOUNDRY, they've reprinted them in an attractive folder. They've gone a step further and given complete performance and application data on core binders, glazes and bonds. A copy of this 30-page manual is yours for the asking.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Helpful Literature" in this issue—simply circle corresponding item numbers on one of these cards

1-53

FOUNDRY
Penton Building, Cleveland 13, Ohio

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60. Molding Machines

Herman Pneumatic Machine Co. — "Herman molding machines have made their way by the way they're made." And, you can find out how they're made from 20-page illustrated brochure which uses this catchy statement as its title. Along with booklet, company offers 13 reproduced line drawings with full tabulated dimensions and other specs on jar disk molding machines, and rollover and pattern drawing, turnover and pattern drawing and stripping devices.

61. Shell Molding Process

Monsanto Chemical Co., Plastics Div.—"The Shell Molding Process, A New and Proved Casting Method for the Foundry Industry," is the title of a 28-page well-illustrated and well-written booklet (No. 77). All the dope on the process, equipment, material, practical considerations and limitations is given.

62. Carbon in the Foundry

Union Carbide & Carbon Corp., National Carbon Div.—In your car, it's bad. In your foundry, it's good. Carbon, that is. For all the dope on skimmer blocks, splash plates, skimmer plates, linings, mold plugs and cinder notch products of carbon and graphite we recommend catalog sections S-5560, 5580, 6180, 5500, 5600 and M8707.

63. Specimen Preparation

Buehler Ltd.—A 4-page and a 6-page illustrated bulletin dealing with specimen preparation equipment for metallurgical laboratory are yours for the asking. Introduced for the first time is the new Streamlined AB speed press for producing Bakelite and transparent molded specimen mounts. Other equipment includes grinders, surfacers, polishers and cut-offs.

64. Electric Furnaces

Whiting Corp.—For some red hot information on the use of electric furnaces as a prime melter and finishing tool or as a supplement to a prime melter, you'll want to get 8-page bulletin FO-6. Twelve tables are presented on line of furnaces which can handle up to 576 tons of metal in 24 hours.

65. Bottom Boards & Jackets

Keyes-Davis Co., Burr Oak Brass & Aluminum Div.—If your ferrous and nonferrous castings have a hard time keeping their girlish contours, they may need Burr-Aluminum bottom boards and jackets. The former, a perfect fit for all types of flask provides a foundation that cannot twist, warp, swell, burn or come apart. The latter prevents swells, shifts, crushed molds and run-outs. They're covered in 4-page bulletin.

66. Dual-Purpose Flux

National Pigment Co.—Castflux as a ladle addition will clean and liquefy molten metal. It does even more than that, too. Properly applied, it increases the temperature of the metal in risers at the surface and thus retards solidification. The cost? Only 5 to 15 cents per ton. How to get better castings is told in 4-page bulletin.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

67. Give 'em the Gate

That informative article "Gating for Shell Molding" which appeared in the August 1952 issue of FOUNDRY is now available in reprint form. Fundamentals of this important phase of shell molding are discussed revealingly by Walter A. Sokolosky, the foundry engineer of Monsanto's plastics division.

68. Steel Casting

Somebody is always telling all he knows about something. Here's a fresh approach. C. E. Sims, assistant director, Battelle Memorial Institute, adds a new phase in dealing with the unknown. You can get a copy of the reprint of his article from FOUNDRY by asking for "Things We Know and Don't Know About Cast Steel."

69. Metals Solidification

Problems involving gating, feeding and chill application are solved more easily when the metals solidification process is understood. Studies conducted at the Naval Research Laboratory are reported in 12-page illustrated FOUNDRY reprint entitled "Solidification of Metals." W. S. Pellini, head, and H. F. Bishop, Metallurgist, tell the how's and wherefore's of this process.

70. Using Used Sand

"Sand Reclamation at the Eddystone Plant" is reprint of 6-page article from FOUNDRY. Two of the top officials of General Steel Castings Corp., Karl S. Howard a V. P. and Chief Metallurgist Clyde B. Jenni, collaborated in explaining the exact techniques used and equipment employed to reclaim 76,000 tons of sand at their plant in a 31-month period. Dollars and cents savings are tabulated. You can save too.

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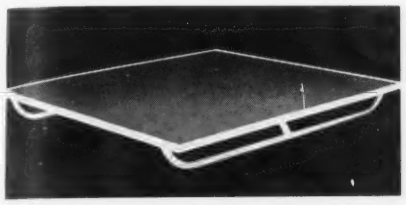
(*Continued from page* 238)

pcf; weight, 2.1 lb per brick; thermal conductivity, 1.25 at 700° F mean; cold crushing strength, 185 psi; modulus of rupture, 145 psi; per cent of linear shrinkage, 0.1 after reheating to 1600° F and 2.0 after reheating to 1800° F.

For More Details Circle No. 11—Page 239

Tubular Steel Pallet: Econoweld Co., 1805 Webster St., Dayton, O.—Eight-entry pallet is made of two or more tubular steel skid runners welded and braced to a rectangular angle iron frame which encases and



protects a tough, laminated wood deck. Sledlike construction permits easy movement over uneven surfaces and obstructions and facilitates compact stacking and easy handling. Production of the new pallet will be to each customer's requirements.

For More Details Circle No. 12—Page 239

Blower: Standard Electric Mfg. Co., West Berlin 12, N. J.—High-pressure blower removes fumes, smoke, dust, sawdust and obnoxious odors. Precision made of aluminum,

it moves up to 450 cfm of air. On standard units, with 5½-in. inlet and 3½-in. outlet, power is supplied by enclosed, 1/6-hp, 115-v, single phase ac, 3450-rpm motor, but larger sizes with different speeds and current characteristics are available.

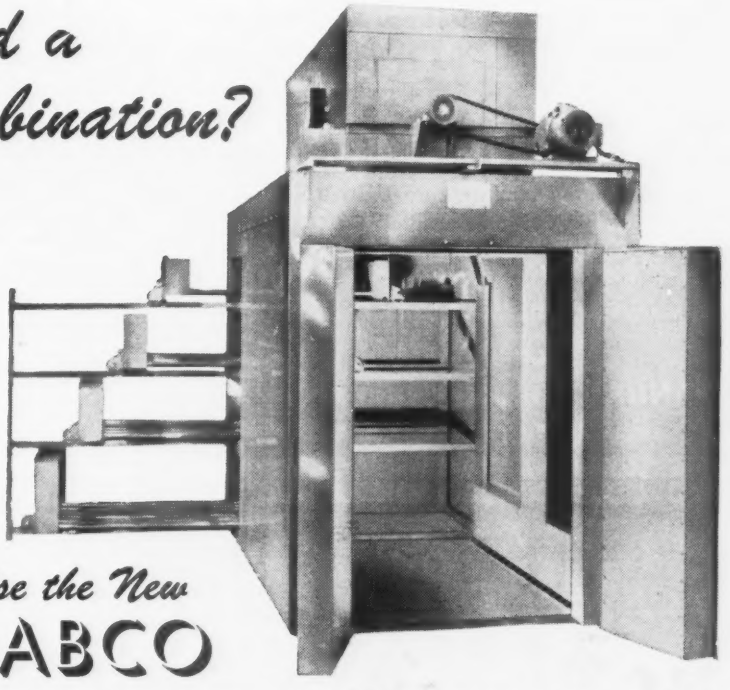
For More Details Circle No. 13—Page 239

Industrial Hose: Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown 1, O.—High-pressure industrial rubber hose is said to have unusual characteristics of strength, flexibility and oil abrasion, heat and cold resistance. It is made with a mandrel cured tube reinforced with a textile carcass continuously braided around the tube in multiple rubber impregnated plies or with alternating plies of braided fabrics and wire or with multiple braids of standard or extra heavy wire only. Carcasses are encased in either abrasion-resistant rubber or braided textile covers. The hose is built to withstand working pressures as high as 5500 psi and temperatures from minus 40°F to plus 200°F. Standard sizes range from 3/16 to 2 in. for hydraulic control hose. It also is designed to meet high-temperatures and high-pressure requirements for steam, air and ammonia.

For More Details Circle No. 14—Page 239

Amplifier: Farmers Engineering & Mfg. Co., Irwin, Pa.—Wired-to-order electronically amplified voice communication system consists of press-to-talk, release-to-listen micro-

Need a Combination?



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COMBINATION DRAWER AND RACK TYPE CORE OVEN

Drawers **for your production run of small cores.**

Racks **for your occasional "big one" which you normally have to job out.**

Keep the PROFITS in your own foundry.

The new MABCO combination drawer and rack type core ovens are masterpieces in engineering and construction.

Check these outstanding features:

- Double wall, Heavy guage steel construction.
- Spot welded throughout and constructed to permit necessary expansion and contraction.
- Drawer section constructed and designed to permit high production baking of small cores.
- Explosion proof doors on rack section of oven.
- Either Gas or Oil fired.
- Six inches of fibre glass insulation.
- Completely automatic starting.

MABCO has a complete line of core ovens designed to fit your needs, including Double Drawer, Single drawer and Rack type core ovens.

Write today for information on these new MABCO Core Ovens.

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"Serving the foundry industry for over 25 years"

Eliminate 70% to 90% of Conveyor Downtime

Cedarapids Schrock Built by IOWA

MOTORIZED HEAD PULLEYS

eliminate maintenance on chains, belts, sprockets, Universal drives, countershafts, etc.

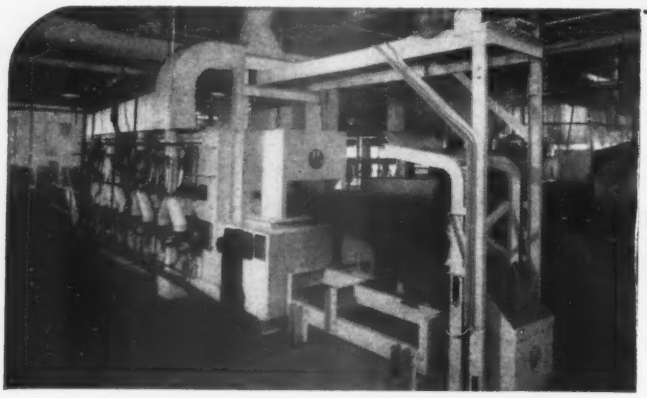
EVERYTHING is contained INSIDE the pulley shell!

HERE'S a money-saving departure from conventional conveyor drives. A Cedarapids-Schrock *Motorized* Head Pulley is simply a new application of the long-proven gear reduction drive, with everything . . . electric motor, reduction gears and all moving parts . . . contained inside the drum, completely protected from grit, dirt and weather and with no outside parts or motors to service. 70% to 90% of conveyor trouble and downtime is saved by eliminating the exposed parts necessary with conventional pulley drives. In operation, the pulley shell rotates about the electric motor which is held stationary by a torque arm attached to the conveyor frame. The speed of the shell depends on the combined reduction ratio of the pinions and gears inside the shell. Compact, easy-to-install, job-proved Motorized Head Pulleys are available in sizes from 5 to 30 HP and in various widths.

Find out all the advantages of converting your belt conveyor or belt-bucket elevator installations to *motorized* efficiency before you need head pulley replacements. See your distributor today, or write for Bulletin MP-1.

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

Built for sale in Arizona, California, Nevada, New Mexico, Southern Oregon, Southwestern Utah and Texas by
YUBA MANUFACTURING CO.
(Pulley and Sprocket Department)
Benica, Calif.



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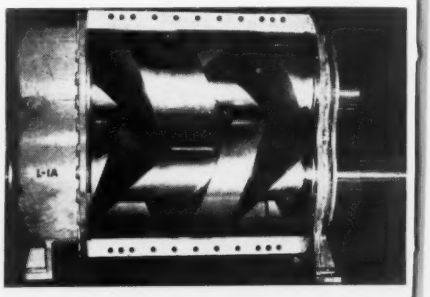
phones and speakers at as many stations as desired. Unless a system is engineered otherwise to suit individual requirements for private, two-way conversations, all stations hear simultaneously. Power is drawn from 110-v, 60-cycle lines with simple plug-in attachments. Output ranges from 10 to 150 w or more. By use of multiple amplifiers and boosters, extensive networks can be installed and co-ordinated.

For More Details Circle No. 15—Page 239

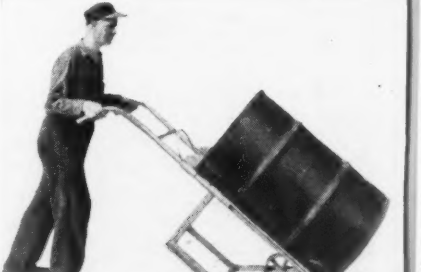
Compressors: Roots-Connersville Blower Corp., 525 Madison Ave., Connersville, Ind.—Gas or air compressor employs two intermeshing screw rotors, shown here, rotating in opposite directions, instead of conventional ro-



tors. Screws are operated by gears synchronized to prevent contact and to allow close but definite clearances between them. Flow of air or gas is axial, with most of the compression taking place at the back of the casing. This feature permits an extremely large inlet opening, prevents strangulation of the inlet air and increases volumetric efficiency. No internal lubrication is used, wearing parts are readily accessible, noise level is low and the machine is light in weight.

For More Details Circle No. 16—Page 239

Truck and Drain Rack: Palmer-Shile Co., 16033 Fullerton, Detroit 27—Combination truck and drain rack can be moved easily through crowded, narrow aisles and around

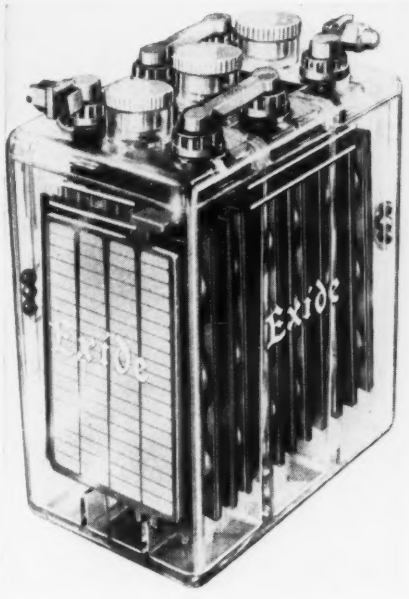


heavy machinery. To load, operator tilts truck against drum, slides steel fingers down to engage top rim of drum and rocks truck back to wheel-

ing position. Slight downward push on truck handles raises wheels and lays rack on floor, thus providing convenient drain of drum. The truck is equipped with detachable handles, one pair of which will serve any number of trucks. Truck rolls on two 8-in. roller bearing wheels. Weight is about 90 lb.

For More Details Circle No. 17—Page 239

Batteries: Electric Storage Battery Co., Box 8109, Philadelphia 1—Batteries for stationary small power applications are available in containers and covers molded from heat-resistant polystyrene, a stable plastic material possessing resistance to damage from shock, thermal and mechanical stresses and any effects from the electrolyte. Permanent seal between containers and covers eliminates leakage of electrolyte for life of battery, and reduced weight makes for lower transportation charges, easier handling and less maintenance expense. Necessary maintenance is



rendered easier by colored pilot balls, which reveal state of charge in a battery at a glance and by colored lines on the containers which mark recommended upper and low levels of the electrolyte. These batteries are available in two-cell units in end-to-end and side-to-side assemblies and, as shown, in three-cell units in side-to-side assembly only.

For More Details Circle No. 18—Page 239

Dock Shelters: Atlas Products Co., 1300 West Washington Blvd., Chicago 7—Mass-produced canvas loading dock shelters extend outward on a collapsible steel framework to shelter truck or freight car loading doors of any size and collapse flush against building when not in use. Manufacturer says each of several standard models also can be adapted to fit any unusual condition of use. Same firm manufactures canvas "wall" curtains for use indoors as effective windbreakers, to stop cold drafts and heat loss. Like the loading dock shelters, they feature steel framework.

For More Details Circle No. 19—Page 239

Fuse Compartment: Electric Machinery Co., Eighth & Central Ave. N. E., Minneapolis 13—Fuse compartment uses gang-operated disconnect method to de-energize fuses on high-voltage motor control and to make them safe and convenient for handling. Current-limiting fuses are gang-mounted on a movable panel behind which are disconnecting blades. When the fuse compartment door is opened, the fuse panel is automatically pulled to the front of the compartment, the fuse panel is disconnected from the line, and the fuses are brought within easy reach. Mechanical and electrical interlocks prevent disconnection of the fuses when the switch is closed and do not permit closing the switch when the door

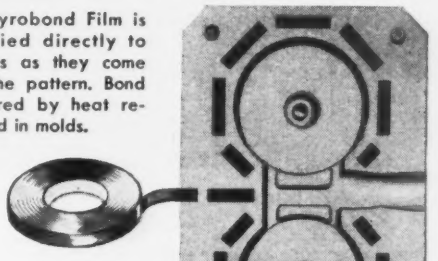
new... for shell molding

PYROBOND adhesive BONDS Shell Mold Halves... gives you these important advantages

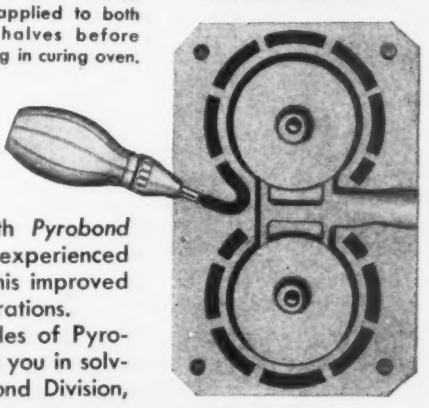
1. Tighter, more uniform closure of mold halves; eliminates need for bolts and clamps.
2. Seals closely and securely around mold cavities.
3. Eliminates need for shot or silica backing in most cases (a critical problem in shell molding).
4. Simplifies reclaiming process; adhesive disintegrates . . . no bolts or clamps to recover.
5. Bonded molds easy to handle and store.

TWO methods of bonding molds with PYROBOND adhesive

1. Pyrobond Film is applied directly to halves as they come off the pattern. Bond is cured by heat retained in molds.



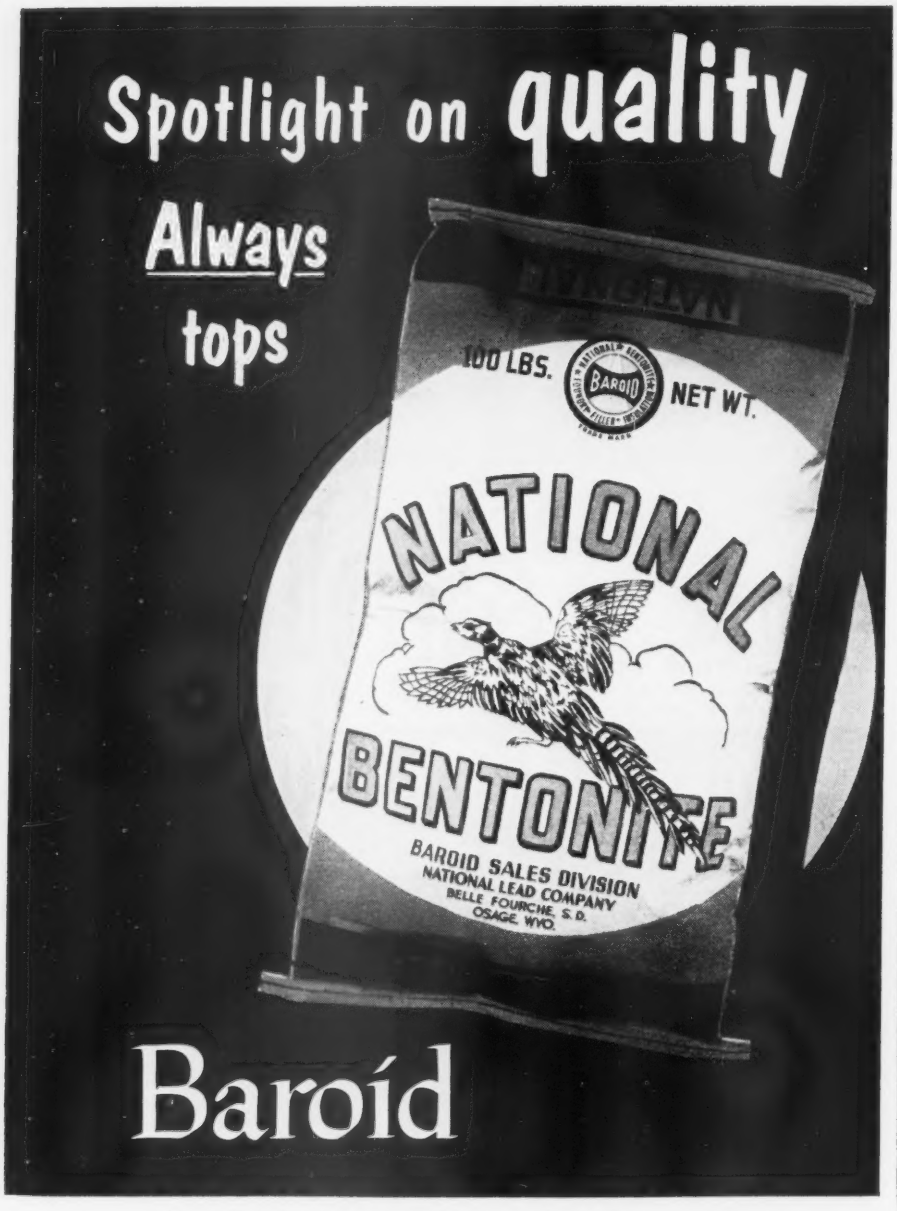
2. Liquid adhesive applied to cold halves and cured by heat retained in hot halves. Also applied to both cold halves before placing in curing oven.



The superior results obtained with *Pyrobond Adhesive* have been proved by experienced shell molders who are now using this improved sealing procedure in their own operations.

Write for full details and samples of Pyrobond Adhesives. We will work with you in solving your problem. Write to Pyrobond Division,

WB WORLD BESTOS
NEW CASTLE, INDIANA



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BENTONITE SALES OFFICE: RAILWAY EXCHANGE BLDG. • CHICAGO 4, ILL.

These approved **DISTRIBUTORS** will give you quick service.

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AMERICAN STEEL & SUPPLY CO.
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THE ASBURY GRAPHITE MILLS, INC.
Asbury, New Jersey

BARADA & PAGE, INC.
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Oklahoma City, Okla.
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New Orleans, La.

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FOUNDRY SERVICE CO.
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INTERSTATE SUPPLY & EQUIPMENT CO.
Milwaukee 4, Wis.

INDEPENDENT FOUNDRY SUPPLY CO.
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INDUSTRIAL SUPPLY CO.
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STEELMAN SALES CO.
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STOLLER CHEMICAL CO.
Akron, Ohio

WEHENN ABRASIVE CO.
Chicago, Illinois

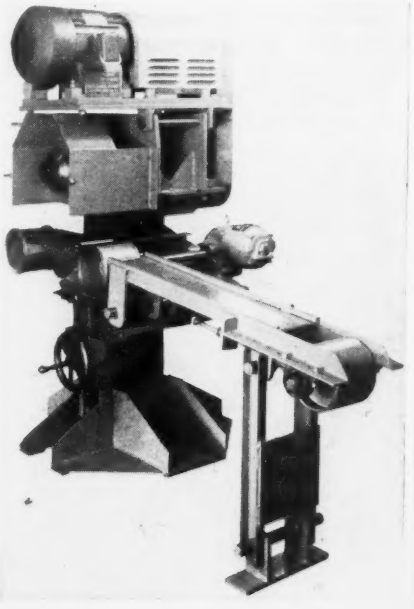
WESTERN MATERIALS CO.
Chicago, Illinois

MR. WALTER A. ZEIS
Webster Groves, Missouri

is open. Target indicators on door tell whether motor switch is open or closed and whether fuse panel is connected or disconnected. Door can be locked with fuse panel in either position.

For More Details Circle No. 20—Page 239

Grinder: Smith Power Transmission Co., 1545 East 23rd St., Cleveland 14—Conveyorized grinding machine designed for production snagging or grinding of small castings can be modified for wide range of pro-



duction grinding, finishing or polishing operations. Parts to be ground are placed in jigs or holders attached to belt conveyor at proper intervals and are carried under wheel, which can be contour dressed. After grinding, parts dump automatically in tote boxes. Grinding wheel on machine shown is 16-in. diam and is driven by 7½-hp motor through all-speed adjustable drive which permits compensation for wheel wear to maintain grinding speed of 6500 fpm. Conveyor section and backup plate under wheel can be raised or lowered 6 in.

For More Details Circle No. 21—Page 239

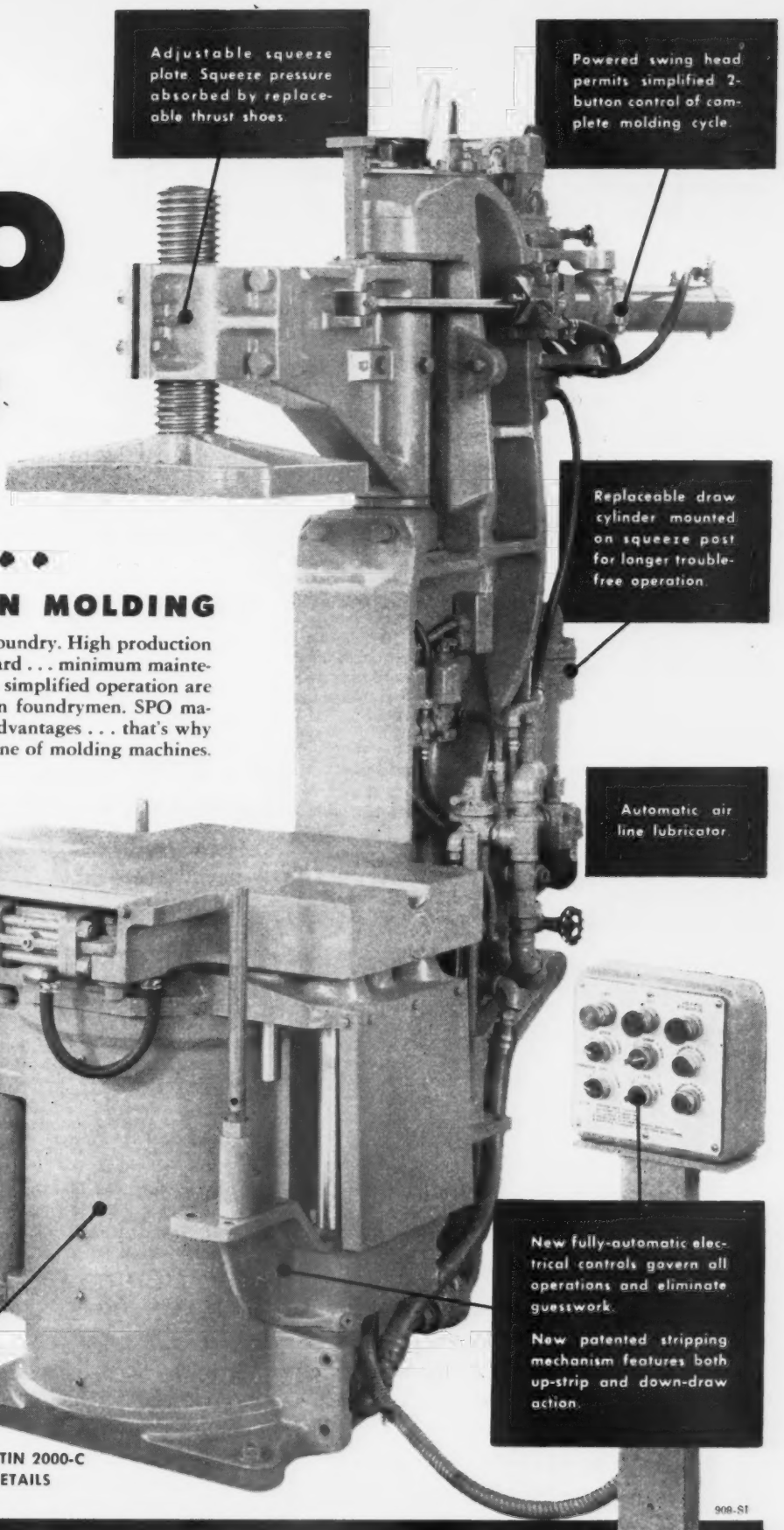
Laboratory Furnaces: Burrell Corp., 2223 Fifth Ave., Pittsburgh 19—Laboratory furnaces for analysis, control and production in chemistry, metallurgy and manufacturing are dual purpose units for both low and high temperature use. From 600 to 2000° F, routine operations such as ashing, drawing, igniting and sintering can be performed. Above 2000° the same furnaces are equally adaptable for sintering, melting, clinkering, fusing and high speed hardening. New models include floor mount and easy access panel opening from the

(*Continued on page* 246)

SPO Builds the Best . . .

FOR PRODUCTION MOLDING

It's *performance* that counts in the foundry. High production capacity . . . molds of uniform standard . . . minimum maintenance and replacement . . . and safe, simplified operation are recognized as "musts" by production foundrymen. SPO machines offer these and many more advantages . . . that's why they are the world's most popular line of molding machines.


Adjustable squeeze plate. Squeeze pressure absorbed by replaceable thrust shoes.
Powered swing head permits simplified 2-button control of complete molding cycle.
Replaceable draw cylinder mounted on squeeze post for longer trouble-free operation.
Automatic air line lubricator.
This Model 2160-C JOLT-SQUEEZE-STRIP/DRAW features a 1500 lb. jolt . . . 16,000 lb. squeeze . . . adjustable pattern draw (6 to 10").
Adjustable stripping pins accommodate wide range of flask sizes.
Patented SPO "inverted jolt" reduces maintenance and replacement costs to minimum.
New fully-automatic electrical controls govern all operations and eliminate guesswork.
New patented stripping mechanism features both up-strip and down-draw action.

WRITE FOR BULLETIN 2000-C
FOR COMPLETE DETAILS

909-S1

SPO INCORPORATED

6449 GRAND DIVISION AVE. • CLEVELAND 25, OHIO

W. S.

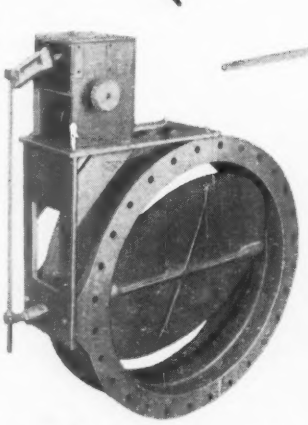
ROCKWELL Butterfly or Slide VALVES

FOR FREE FLOW
EASY CONTROL
QUICK SHUT-OFF
of Air · Gas
Liquids · Solids

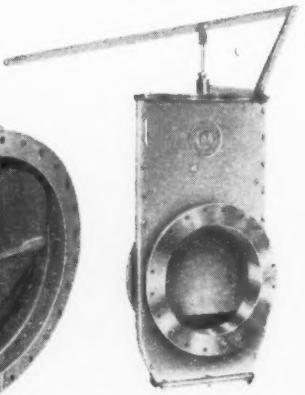
Rockwell Slide or Butterfly Valves are made in a wide range of types and sizes to meet every foundry requirement for control or shut-off of hot or cold air or gases, clean or laden with dust, grit or flue particles; liquids or granular solids. They are used extensively in connection with heating, conveying, dust collecting and cleaning equipment or pipe lines. They offer you

TIGHTNESS—commercial, drip tight or air tight construction to meet your needs.
PRESSURES—built rugged for operation at any pressure—even to 600 p.s.i., if necessary.
TEMPERATURE—as high as 2000° F.
RESISTANCE—valves made of any metal or rubber-lined for resistance to corrosion or abrasion.
CONTROL—lever, wheel, air diaphragm, air or hydraulic cylinder, electric motor, solenoid, float, etc.
SIZES—from 1" to 72" and larger.

Get the Rockwell Valve Catalog



Rockwell Standard Butterfly Valve with electric motor operator; may be equipped with air or hydraulic operator, solenoid or any manual control.

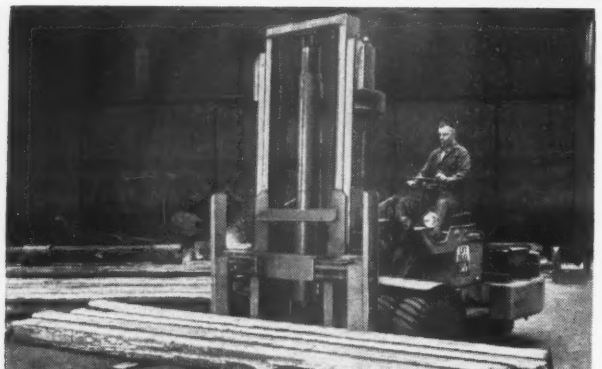


Rockwell "Kwikleen" Slide Valve with lever control; bottom plate easily removed for quick cleaning of valve.

W. S. ROCKWELL COMPANY

2263 Eliot Street • Fairfield, Conn.

HEAVY INDUSTRY HARNESSES *HEAVY-DUTY FORK* **LIFTRUK ON THE PRODUCTION LINE!**



Here you see a LIFTRUK in the *Timken Roller Bearing Company* plant, Canton, Ohio, carrying a load of 10 tons of alloy steel forgings. This is but one of hundreds of important movements required of a LIFTRUK in the metal-production fields.

LIFTRUKS are available in 5 - 7½ - 10 - 15 Ton capacities. Larger sizes to order.

SEND FOR BULLETIN 77

LIFTRUK features = 1—Rugged dead axle for traction wheels. 2—Extra large elevating hydraulic cylinders. 3—Oversize engine clutch. 4—Generous sturdy construction of tiering frames and fork apron—these and other LIFTRUK features assure you of production materials handling and elimination of shut downs or slow ups.

Let our sales engineers give convincing proof of LIFTRUK performance to meet *your* specific needs.

Also available with Boom, Ram, Scoop and other attachments.

SILENT HOIST & CRANE CO.

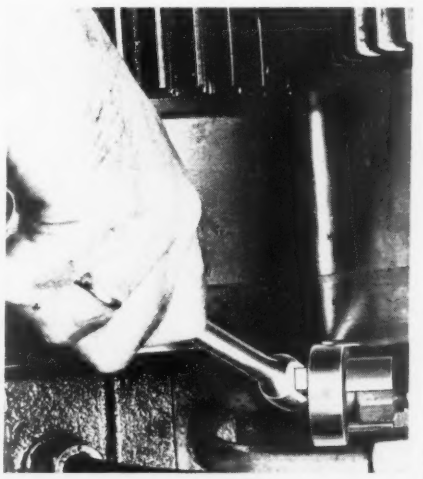
885 63rd STREET, BROOKLYN, N. Y., U. S. A.

(*Continued from page* 244)

front for inspection and servicing; variously sized heating chambers, all designed for accessibility and use of rod-shaped silicon carbide elements. These box and muffle furnaces are self-contained units, fully equipped and delivered ready to operate by connection to the existing power supply, 115 or 230 v, 50-60 cycle, single phase. Transformers for other voltages and frequencies are furnished to order.

For More Details Circle No. 22—Page 239

Ratcheting Wrench: Tubing Appliance Co., 7112 South Victoria Ave., Los Angeles—Open-end ratcheting socket wrench permits introduction from any side of socket, over and completely around a pipe or tube and straight down on the fitting so



that socket engages nut or bolt and ratchets it off or on as fast as the arm can swing. Wrench engages fittings by surrounding the standing center obstacle (such as tube, pipe, conduit, cable or long stud); head ratchets by internal pawls acting upon teeth cut into a strong ring which travels in a circular channel around the head. As little as 7 degrees clearance for the regulation square drive handle will permit normal functioning. Thin walled sockets come in a range from ⅜ to 4 in. in 1/16 in. increments in 64 sizes, enabling the tool to perform as open end, adjustable, box, socket and ratchet wrench. Additional adaptors provide a turnbuckle, hex, square drive, rigid head, Phillips screwdriver, Allen head, spanner and push rod housing.

For More Details Circle No. 23—Page 239

Electric Hoists: Yale & Towne Mfg. Co., Philadelphia 15—Deck type electric hoists in capacities of 1 to 15 tons are designed for top mount-

(*Continued on page* 248)

VANCORAM PRODUCTS

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
ALUMINUM ALLOYS		
Alsifer	Aluminum ..... 20% Silicon ..... 40% Iron 40%	Used principally as a steel deoxidizer and for grain size control.
Deoxidizing Grades	Aluminum .... 85 to 99%	Standard grades.
Silicon Aluminum	Silicon ..... 5 to 20% Aluminum ..... Bal.	For sand, permanent mold and die casting.
Titanium Aluminum	Titanium .... 2½ and 5% Aluminum ..... Bal.	For grain refinement and improved physical properties of commercial aluminum alloys.
Vanadium Aluminum	Vanadium .. 2½, 5, 10% Aluminum ..... Bal.	For control of thermal expansion, electrical resistivity, and grain size of commercial aluminum.
BORON ALLOYS		
Ferro Boron	Boron ..... 14/18% Carbon ..... 1.50% Silicon ..... max. 5.00% Aluminum .. max. 0.10%	For adding boron to steels and irons.
Vanadium Grainal No. 1	Vanadium ..... 25.00% Aluminum ..... 10.00% Titanium ..... 15.00% Boron 0.20%	Practical and economical intensifiers for controlling and increasing the capacity of steels to harden, and for improving other important engineering and physical properties.
Grainal No. 79	Aluminum ..... 13.00% Titanium ..... 20.00% Zirconium ..... 4.00% Manganese ..... 8.00% Boron ..... 0.50% Silicon 5.00%	
CHROMIUM ALLOYS		
Ferro Chromium Briquettes	Hexagonal. Weigh approx. 3⅜ lb., contain 2 lb. of chromium.	A practical and convenient form for adding ferro-chromium to the cupola.
High Carbon Grade	Chromium ..... 66/70% Carbon 4/6%	For wrought constructional steels and steel and iron castings.
Iron Foundry Grade	Chromium ..... 62/66% Carbon ..... 4/6% Silicon 6/9%	For alloyed cast irons. Ladle addition readily soluble at lower temperatures of cast iron.
Low Carbon Grades	Chromium ..... 67/72% Carbon .... .06%, .10%, .15%, .20%, .50%, 1.00% and 2.00% max.	For low carbon chromium steels, especially those with high chromium content, such as stainless steels and heat-resistant types.
Low Carbon Ferrochrome-Silicon	Chromium ..... 39/42% Silicon ..... 40/42% Carbon .... max. 0.05%	Used in stainless steels to reduce chromium oxide from slag and to add chromium to steel.
Experimental Ferrochrome-Silicon Alloy	Chromium ..... 48/52% Silicon ..... 25/30% Carbon ..... max. 1.50%	For simultaneous addition of chromium and silicon to low alloy steels and cast iron.
SILICON ALLOYS		
Ferro Silicon Briquettes	Two sizes, both cylindrical. The smaller contains 1 lb. of silicon; the larger, 2 lbs. of silicon.	A practical and convenient form for adding ferro-silicon to the cupola.
25/30% Grade	Silicon 25/30%	To deoxidize open hearth steels and add silicon to cast iron.
50% Grade	Silicon 47/52%	To deoxidize and add silicon to steels and cast irons.
75% Grade	Silicon 74/79%	For high content silicon steels.
80/85% Grade	Silicon 80/84.9%	For high silicon addition to steel; for slag treatment and graphitization of iron; for making magnesium.
85/90% Grade	Silicon 85/89.9%	
90/95% Grade	Silicon 90/95%	
Silicon Metal	Silicon ..... min. 96%	For making aluminum, other nonferrous alloys and silicones.

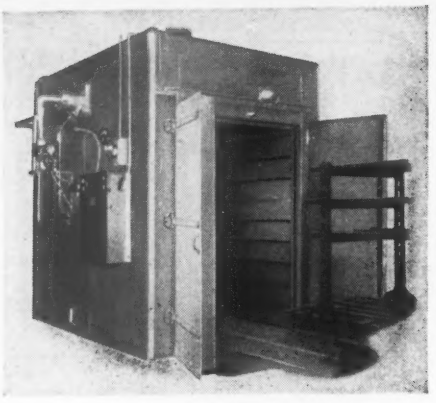
PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
SPECIAL FOUNDRY ALLOYS		
Graphidox No. 4	Silicon ..... 48/52% Titanium ..... 9/11% Calcium 5/7%	Graphitizer for high strength cast irons; reduces chill; supplementary deoxidizer for cast steel.
Noduloy No. 12	Magnesium .. 10.5/13% Copper ..... 15/18% Silicon ..... 37/41% Iron ..... Bal.	Magnesium-containing alloys for addition to molten cast iron for manufacture of ductile (nodular) iron.
Noduloy No. 3	Magnesium 13.5/16.5% Silicon ..... 62/67% Iron ..... Bal.	
V-5 Foundry Alloy	Chromium ..... 38/42% Silicon ..... 17/19% Manganese 8/11%	To reduce chill and increase strength and hardness of cast iron.
TITANIUM ALLOYS		
Ferro Titanium High Carbon Grade	Titanium ..... 15/18% Carbon 6/8%	To control rimming action and deoxidize steel.
Medium Carbon Grade	Titanium ..... 17/21% Carbon 3/4.50%	To deoxidize and to add titanium to killed steels.
Low Carbon Grades 25% Titanium	Titanium ..... 20/25% Carbon .... max. 0.10% Silicon ..... max. 4.00% Aluminum .. max. 3.50%	Carbide stabilizer in high chromium corrosion-resistant steels of extremely low aluminum content. Deoxidizer for some steels.
25/32% Titanium Special	Titanium ..... 25/32% Carbon .... max. 0.10% Silicon ..... max. 4.00% Aluminum .. max. 2.00%	Alloy of high titanium-to-aluminum ratio for adding relatively large amounts of titanium to stainless and heat-resistant steels.
40% Titanium	Titanium ..... 38/43% Carbon .... max. 0.10% Silicon ..... max. 4.00% Aluminum .. max. 8.00%	Carbide stabilizer in high chromium corrosion-resistant steels.
VANADIUM ALLOYS		
Ferro Vanadium Iron Foundry Grade	Vanadium ..... 38/42% Silicon ..... 7/11% Carbon ..... about 1%	Imparts remarkable improvement in physical properties of iron with no sacrifice of machinability.
Grade A (Open Hearth)	Vanadium ..... 50/55% Silicon ..... max. 7.50% Carbon ..... max. 3.00%	For low vanadium steels and vanadium cast irons.
Grade B (Crucible)	Vanadium ..... 50/55% Silicon .... max. 3.50% Carbon ..... max. 0.50%	For tool steels and other high vanadium steels requiring a limited silicon addition.
Grade C (Primos)	Vanadium ..... 50/55% 70/80% Silicon ..... max. 1.25% Carbon ..... max. 0.20%	For making the highest vanadium and the lowest silicon addition to tool steels.
Vanadium Metal 90% Grade	Vanadium ..... 91.15% Aluminum ..... 2.25% Silicon ..... 0.50% Carbon 0.17%	For special iron-free (non-ferrous) or low iron alloys or low impurity ferrous alloys.
95% Grade	Vanadium ..... 95.18% Aluminum ..... 2.00% Silicon ..... 0.27% Carbon 0.40%	Principally for research on the properties of pure alloys. For use in applications where very low iron content is essential.
Vanadium Pentoxide, Tech. Fused Form	V_2O_5 ..... 88/92%	A source of vanadium in basic electric furnace steels. A base for numerous chemical compounds.
Air-Dried Form	V_2O_5 ..... 83/85%	Base for chemical compounds.
Ammonium Meta Vanadate, Tech.	NH_4VO_3 ..... min. 99%	For making sulphuric acid, synthetic organic compounds and vanadium chemicals.

Also special alloys, chemicals and metals of Aluminum, Chromium, Silicon, Titanium and Vanadium.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • CHICAGO • DETROIT • CLEVELAND • PITTSBURGH

"Moco" OVENS
SOLVE OVEN PROBLEMS



OUR staff of oven designers, with their combined oven engineering experience of 150 years, is at your command to work with you on your core-baking problems. Just say the word and we shall be glad to have our representative call.

Write for Brochure: "Your Oven Problems"

MICHIGAN OVEN COMPANY DETROIT MICHIGAN MOCO

Representatives In
Principal Industrial Areas

MICHIGAN OVEN COMPANY
419 Brainard St. Detroit 1, Mich.

FIRST AID
Whenever core blowing occurs from poor venting

BUFFALO BRAND
VENT WAX

Why build up the scrap pile with discard castings, when a few pennies worth of Buffalo Brand Vent Wax will provide certain protection against core blowing. For over 43 years foundries have relied on Buffalo Brand Vent Wax . . . for proper venting of even the most intricate cores.

SEND FOR SAMPLE—TEST IT YOURSELF!

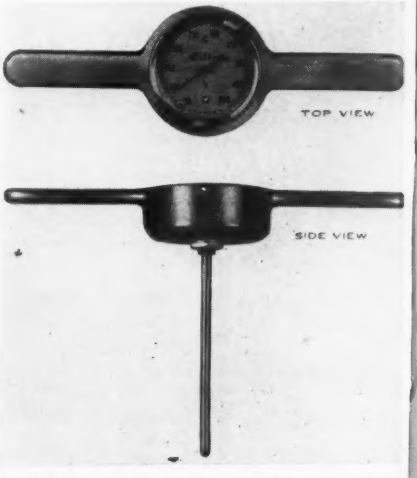
UNITED COMPOUND CO.
328 SOUTH PARK AVE., BUFFALO, N. Y.

(*Continued from page* 246)

ing in double-girder bridge cranes. They feature compactness of design; triple reduction, spur-geared drive; totally enclosed, fan-cooled motor; heavy steel suspension frame, and pushbutton-operated heavy-duty contractor. For safety, these hoists are equipped with two brakes: A friction brake in the gear train, and a solenoid-operated contracting drum type motor brake. The control station can be mounted in the crane cab or be remotely located. Controls for operation of the trolley and the bridge also are available.

For More Details Circle No. 24—Page 239

Thermometer: W. C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif.—Thermometer with comfortable hand grips on opposite sides of the dial can be plunged directly into



foundry sand, hot asphalt, chemical mixtures, etc., without burning the operator. Curved to fit the palm of the hand, the handle also protects the thermometer since it completely encases the edge and bottom portion. The instrument is available in dial diameters of 2¼, 2$\frac{13}{16}$ and 4¾ in. with stem lengths up to 72 in. Ranges cover all popular requirements in either Fahrenheit or Centigrade, and special ones can be made to order. Each thermometer is individually calibrated with guaranteed accuracy of 1 per cent of the full scale reading.

For More Details Circle No. 25—Page 239

Furnace Charger Truck: Mercury Mfg. Co., 4044 South Halsted St., Chicago 9—Furnace charger truck with capacity of 4000 lb picks up stacks of annealing pots filled with castings, places them in annealing ovens and removes them after completion of annealing process. Lift necessary to pick up and deposit loads is provided through tilting action of load carrier, which

(*Continued on page* 250)

FLUXES and EXOTHERMIC COMPOUNDS

for all

Metals and Alloys

THERMOTOMIC "X" COMPOUND is an exothermic material which is molded and baked into necked down riser cores and inserts. It produces a temperature of 3500° F. and is used as ring inserts under the risers or feeding heads. Great savings are realized through reduced riser dimensions and cleaning costs. For use on top of the metal in the heads we recommend Carbon Free Liquidizer No. 5.

THERMOTOMIC ABC—For aluminum and magnesium castings, necked down riser cores and inserts—prevents piping and shrinkage into castings. Soffel's ALX-31 Liquidizer should be used on top of the metals in the head.

THERMOTOMIC HoTop LIQUIDIZER — For short risers—save 60 to 70% of feeding metal in the heads.

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER—Feeding head compound for castings and ingots of ferrous and non-ferrous metals—saves metal and prevents piping and shrinkage.

CARBON FREE LIQUIDIZER AL-X31—For aluminum and magnesium feeding heads—prevents piping.

EXOTHERMIC INSULATING SLEEVE CORE COMPOUND—For riser sleeves—adds heat and prolongs fluidity of feeding metal in heads or risers.

DENSILTITE LADLE FLUX—For iron and semi-steel —reduces sulfur and phosphorous. Adds fluidity and temperature in pouring ladles—produces clean iron.

SOFFEL'S NON-FERROUS FLUXES

BB-2—For red brass, nickel and tin bronze pressure castings—removes sulfur, iron, phosphorous oxides and gas from brass and bronze.

SUPER BRASS FLUX—For brass and bronze—Prevents oxidation of zinc.

BRASS REFINING FLUX—For cupola melting and open flame furnaces—prevents oxidation. Produces liquid slag and faster melting.

COVERALL BRASS FLUX—Removes gas and oxides from yellow brass and nickel silver.

RADIOCLARITE BRASS FLUX—For open flame furnace melting—increases fluidity, tensile strength, removes gas, oxides and iron.

AB-6 BRASS FLUX—For electric furnace melting of brass and aluminum bronze—keeps furnace linings clean.

KLEEN-ALL BRASS CLEANER—Absorbs liquid slag and oxides from the metal—keeps ladles and furnace linings clean.

BRASS ALUMINUM REMOVER—Removes all traces of aluminum from copper, brass or bronze.

HI-LED BRONZE FLUX—Holds lead up to 50% in copper without use of nickel.

NICKEL MONEL FLUX—Removes gas and adds fluidity to metal.

ALUMINUM BRONZE FLUX—A perfect deoxidizer for reducing aluminum and iron oxide in manganese bronze and aluminum bronze. Adds fluidity.

COPPERTITE FLUX—For high conductivity casting—removes cuprous and cupric oxides and gas from copper.

FERRO-OUT IRON REMOVER—Removes free iron or alloyed iron from brass, bronze or copper.

SOFFELITE ALUMINUM FLUX—Removes aluminum oxide and iron from aluminum and increases the fluidity and tensile strength.

MAGNALUM FLUX—For magnesium and aluminum alloys — removes gas and oxide and increases fluidity.

KLEN ZINC FLUX — A deoxidizer and purifier for zinc base pressure die castings—removes gas, sulfur and iron.

DIE COATING—For pressure zinc base die castings —will not scale, blister or create gas in the molds.

PERMANENT MOLD COATING—For aluminum and magnesium castings — adds longer life to molds. Produces clean gas free castings.

POT COATING—For iron pot melting — increases life of pots. Prevents iron pick up.

U. S. Patents No. 2,490,327 and No. 2,500,097

PITTSBURGH METALS PURIFYING COMPANY

World's Largest Manufacturers of Fluxes and Purifiers For All Metals and Alloys

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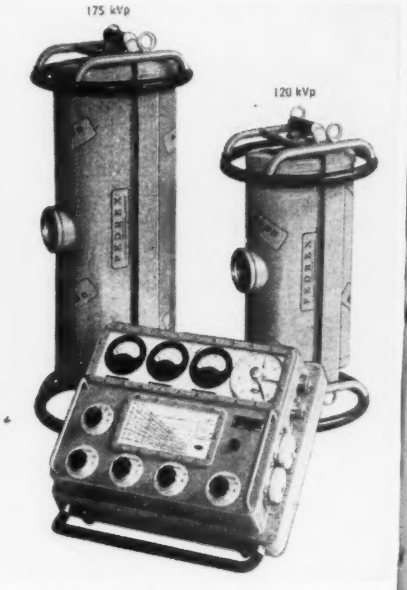
(*Continued from page* 248)

pivots backward through a maximum of 10 degrees. Essentially one of the company's rear control stand-up fork truck models, the machine features heavy-duty drive, controlled caster steering axle, automotive steering and four-speed travel control. Truck uses gas-electric power or standard battery power source.

For More Details Circle No. 26—Page 239

Portable X-Ray Unit: Holger Andreasen Inc., 703 Market St., San Francisco—Portable x-ray unit developed in Europe is available in this country in a new and improved model. X-ray tube and other high-tension



parts are combined in one all-welded tank. Because high-tension cables, cooling connections, separate transformers and cooling pumps have been eliminated, the unit can be carried by one man and minimizes maintenance and repair problems. Manufacturer claims high operating efficiency for the machine. Units are available in capacities of 120 and 175 kvp, and a 250-kvp model is scheduled for early production, as are various special models. Service and parts are available in this country.

For More Details Circle No. 27—Page 239

Band Saw Guide: Crescent Machine Division, Rockwell Mfg. Co., 400 North Lexington Ave., Pittsburgh 8—Precision band saw guides used on the firm's band saw machines are said to speed production, save saw blades and prevent wasted machine time, labor and materials by holding saw blade rigidly and close to work. Micrometer adjustments can be made while the machine is running. Body and brackets of the guide are die cast of high-strength zinc alloy. Guide wheel and jaw blocks have been designed to take the wear in-

stead of the saw blade by preventing heat which crystallizes and galls the blade. Replacement of either of these low-cost parts can be made in a few minutes. Guides are available for saw widths of ¾, 1¼ and 1¾ in.

For More Details Circle No. 28—Page 239

Pallet Trucks: Clark Equipment Co., Industrial Truck Division, Battle Creek 16, Mich.—Electric-battery-powered pallet trucks with capacities up to 6000 lb can be supplied with pallet forks to handle single or double faced pallets of any size. These trucks are available in either "rider" or "walker" models. "Rider" model, with a tread plate on which the operator can stand, takes power from a single tray battery arrangement. "Walker" model has a double tray battery layout. Features include double hoisting cylinders, 5-hp motor-in-wheel drive, full time delay control with all contactors interlocked for progressive speed positions, positive safety spring return handle which applies brake and cuts off power, and a high bumper guard to protect operator. Frame, forks and elevating carriage are of cast steel.

For More Details Circle No. 29—Page 239

Powder-Cutting Unit: National Cylinder Gas Co., 840 North Michigan Ave., Chicago 11—New model of powder dispensing unit for powder cutting stainless and other hard-to-

cut steels provides greater uniformity of powder flow as a result of improvements in powder regulating and ejecting mechanisms. Dispenser and a cylinder of powder-conveying gas can be mounted on an ordinary two-wheel gas cylinder truck. Gas pressure and rate of powder flow are maintained automatically by the dispensing unit. Powder control valve also is automatic and operates simul-

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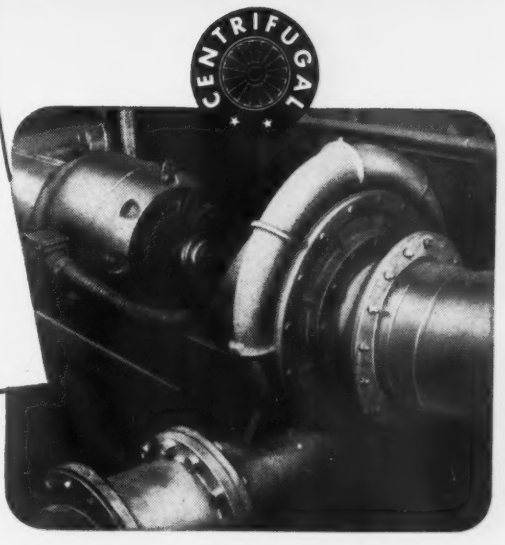

Type OIB Centrifugal Blower for cupola service in western foundry. Capacity 6,000 cfm.

You can't afford to take chances when production and profits depend on maintained performance of blowers, exhausters, gas pumps or related equipment. So, we suggest that you check carefully the above factors before you make your final decision.

If you are faced with a choice between Centrifugals or Rotary Positives, remember that only Roots-Connersville makes both types. From our exclusive *dual-ability line*, with capacities from 10 cfm to 100,000 cfm, at moderate pressures, most buyers can find a unit closely matched to their specific needs.

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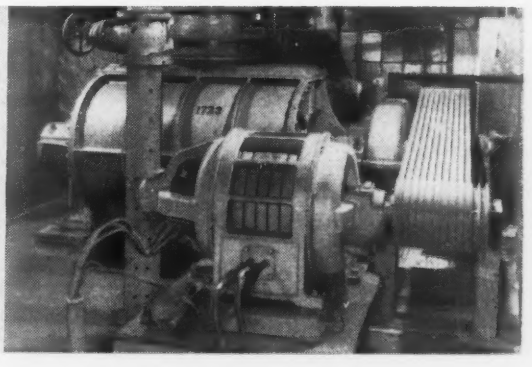
ROTARY

Type RCS Foundry Cupola Blower, capacity 10,200 cfm. Replaced a 20-year old R-C Blower, still retained for stand-by service.



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New, Larger COVER GOGGLES

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New CESCO **Cover Goggles** fit well over all popular styles of glasses—even over extreme types such as these.

FEATURES

Lightweight, sturdy plastic with contoured edges. Weight is well-distributed for comfort and safety.

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Slots in edges of lens frames and rings are offset to baffle air flow.

HEADBANDS

Three types, all fully adjustable—Comfort King round rubber, flat rubber, or elastic.

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Perforated for chipping and grinding.

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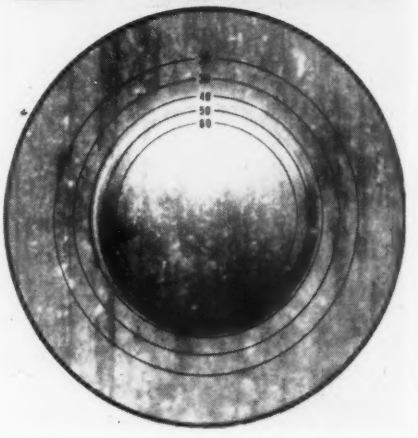
taneously with turning on and shutting off of cutting oxygen valve on torch. Machine and hand cutting torches are available. For foundry use, a flame washing torch has been developed for rapid removal of riser pads, chill bars, fins, and other material from stainless and other alloy steel castings.

For More Details Circle No. 30—Page 239

Hardness Tester: Pacific Transducer Corp., 11921 West Pico Blvd., Los Angeles 64—Low-cost hardness tester for determining hardness of steel alloys and other metals in range of from 25 to 65 Rockwell "C" scale can be carried in a pocket. It can



be used to test specimens in almost any place or position by direct reading without further calculations. Impact indentor drives a 1/16-in. tungsten carbide ball a short distance into sample to be tested, and the diameter, which is a function of the hardness, is measured by a reticulated microscope with an accuracy of plus or minus 1½ points "C" scale.

For More Details Circle No. 31—Page 239

Snow Plow: Prime Mover Co., Muscatine, Iowa—Snow plow attachment with 50-in. angling blade easily can be installed on or removed from power wheelbarrow. While the blade is being used, the 10 cu ft bucket of the wheelbarrow can be filled with ballast or with sand for spreading on icy walks. Quick interchangeability of the blade permits easy conversion from snow plowing to materials handling or the reverse.

For More Details Circle No. 32—Page 239

PURDUE METALS CASTING CONFERENCE

Looks at Castings from Buyers' Viewpoint

By ERLE F. ROSS
Chicago Editor
FOUNDRY

THE fifth annual Metals Casting Conference held at Purdue University, West Lafayette, Ind., Oct. 30-31, upheld the traditions and successes of the four previous events. Registered attendance of 240 equaled the record established a year ago. Actually, however, the total was larger because more students enrolled in engineering courses sat in at various sessions.

This year's conference was planned around the viewpoint of buyers of castings and what producers can do to accommodate their requirements. Other themes developed in addresses and papers, such as quality control, casting design and materials handling, dovetailed well into the overlying topic of the buyers' interests.

Primary purpose of the Purdue conferences is to bring together men interested in the latest developments and current practices resulting from conditions existing in the metals casting field at time the meeting is held. This year, as last, found the national defense program exerting an influence on the closer relationship between users and manufacturers of castings. Unlike last year, little was heard this time on the subject of materials availability, reflecting the better supply conditions today.

Purdue stands in an excellent position to bring foundrymen and castings consumers together because of its recently modernized foundry laboratory and its expanding participation in the Foundry Educational Foundation program.

The conference, conducted in the Memorial Union Building, was sponsored jointly by the department of general engineering, division of adult education, and the Michiana and Central Indiana Chapters of the American Foundrymen's Society.

Lewis D. Reiff, assistant general manager, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., was chairman of the Conference Committee. Program chairman was James A. Barrett, assistant general superintendent, National Malleable & Steel Castings Co., Indianapolis.

Chairman of the opening session was H. A. Bolz, head of the department of general engineering at Purdue. He introduced Dr. E. W. Comings, head of the school of chemical and metallurgical engineering, to extend an official university greeting on behalf of A. A. Potter, dean of the schools of engineering, who was out of the city.

Dr. Comings emphasized that the university supplies industry with educated men and with ideas. These he chose to regard as the "know how" and the "know why," both being essentials. He mentioned that enrollment of engineering students has again turned upward, as compared with a downward trend the last three or four years, but the level is just back to where it was. His warning was that not enough engineers are being trained to meet the growing demands of industry.

Providing the greeting on behalf of the American Foundrymen's Society was National President I. R. Wagner, Electric Steel Castings Co., Indianapolis. First off, he referred to the numerous foundry conferences held over the country each year and paid tribute to AFS Secretary Emeritus Robert E. Kennedy who originated the conference idea and sponsored the first event in 1930, even before the society had chapters.

Continuing, Mr. Wagner admonished that the Foundry Educational Foundation may backfire unless some means is found to integrate the engineering graduates it sponsors with existing foundry personnel. Management has an obligation to shop-trained men as well as college trained, he explained. Many companies, unfortunately, have no training program for men below the college level. In other words, foundries have need for both types of men, must have training programs for both, and must have procedures for absorbing and advancing them into their organizations harmoniously.

Because the conference theme was the "Buyer's Viewpoint," Joseph P. Stanton, buyer, Ford Motor Co., Detroit, the first speaker on the technical side of the conference program, most adequately served the function of keynoter. In his opinion, experience of the buyer is the principal

Technical session at the Purdue meeting devoted to shell molding attracted a capacity audience

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The Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, permeability, bond strength, moisture, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

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factor in determining the potential suppliers of the parts he needs. For a vendor to qualify, he must have: (1) Ability to produce according to specifications, namely, quality; (2) facilities for production of quantities needed and for delivery on time; and (3) satisfactory f.o.b. costs.

Mechanization of foundries, the speaker declared, has not kept pace with mechanization in machining and assembly operations in the country's large mass production industries.

In elaborating on the ability of a manufacturer to conform to specifications, Mr Stanton pointed to the need for quality control in castings. One chilled casting can damage a machining line. Statistical quality control is not something to be shunned—it is simply a system based on probabilities. It is the selection and use of information which is applicable to the control of production of a given part.

A good foundry engineer can be of much help to the buyer of castings, the speaker asserted. Such an engineer works with the designer and co-operates with those responsible for machining procedures, then turns his efforts toward getting foundry processes determined to produce the castings required. The foundry engineer must also be forward minded, because users of castings always have plans for product improvement.

Look Backward and Forward

"Present and Future of the Casting Industry" was discussed at the second conference session by Frank G. Steinebach, editor of FOUNDRY, Cleveland. Chairman of this meeting was R. W. Lindley, professor of manufacturing processes, Purdue University.

Mr. Steinebach started out by taking a look at the castings industry during the last 12 years. In 1940, the country was just coming out of a depression, and then World War II broke. Need for steel castings brought immediate recognition to steel foundries. Likewise, the nonferrous industry rated high in essentiality. During the war, requirements for aluminum and magnesium casting sky-rocketed. It was 1943, however, before recognition was given to gray iron and malleable castings as important to the war effort.

The foundry industry is constantly seeking new ideas, the speaker stated. It can point with pride to numerous developments of the past few years, for example, ductile iron,

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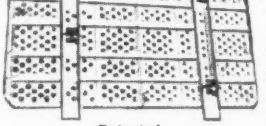
Nomad flexibility brings new efficiency to any foundry layout!

This entirely new foundry conveyor system is "based on a principle as logical as mounting a boxcar on wheels." Basically as simple as that, its flexibility permits easy adaptation to any foundry layout. Numerous specially engineered NOMAD systems have been installed involving the use of curves, switches, transfer cars, and sloped sections.

NOMAD Foundry Equipment engineers are available to assist you to make the most efficient use of your facilities . . . to bring to your operation increased production through reduction in lost molds, lower maintenance costs and an overall substantial saving in time and manpower.

RIGID ALUMINUM BOTTOM BOARD



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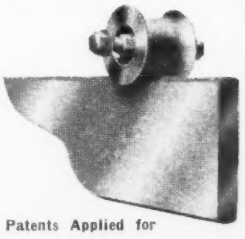
Special rounded rail edge is automatically cleaned by smooth passage of non-lubricated ball bearing rollers. Bar construction eliminates horizontal dirt collecting surfaces.

BOTTOM BOARD ROLLER ON RAIL



Patents Applied for

Deep seated bottom board rollers, shielded from sand and molten metal, eliminate vibration and sudden shifts often caused by sticking conveyor rollers.

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shell molding, investment molding, improvement in equipment, coremaking machinery, increased mechanization and wider acceptance of production and quality control.

A most notable achievement, Mr. Steinebach declared, was formation of the National Castings Council after end of the war. For the first time all branches of the castings industry have been brought together in a common interest, a move which has proved its worth in the current national defense program. Thus the foundry industry has enhanced its position in the eyes of government.

Immediate future of the castings industry is difficult to appraise, Mr. Steinebach stated, because whims of the government can change the picture quickly. However, government estimate is that in 1965 the nation's foundries should be prepared to turn out 29.5 million tons of all kinds of castings.

In taking over as chairman of the concluding portion of the afternoon session, W. G. Ferrell, vice president in charge of manufacturing, Auto Specialties Mfg. Co., St. Joseph, Mich., made a strong plea for support of the AFS safety and hygiene program. The foundry industry, he said, needs production workers, and the saving of hands, arms and lives is far more important than the savings in insurance premiums which accrue from a good safety rating.

"The Foundry's Part in Better Castings" was discussed jointly by Robert J. Franck, product engineer, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., and E. Crowell Knight, Ross Gear & Tool Co., Lafayette, Ind.

Speaking first and from the producers viewpoint, Mr. Franck pointed out that there are many variables in producing good castings, and controls must be set up for them. To facilitate such control, his company set up a castings development department. A few of the many responsibilities of the department are the control of shrinkage, redesign of castings to improve production and quality, improvement of gating and risering, and stress analysis.

Mr. Knight, speaking from the viewpoint of a buyer of castings, emphasized the importance of the user setting methods. When a manufacturer introduces a new product, he usually relies on past practice as to its design. Under the new conception of manufacturer and casting maker working together, it is possible to achieve notable costs advantages, lower casting products costs, and the like.

The speaker stressed the point that frequently increasing the weights of castings because of larger section sizes will yield overall benefits. The changing of section sizes upward or increasing radii sometimes so simplifies production procedures in the foundry that a greater yield is derived.

Morning session on the second conference day featured an excellent discussion on quality control. This was chairmanned by Allen A. Evans, quality control engineer, International Harvester Co., Indianapolis.

The technical paper on the subject was titled "What Quality Control Means to Engineering and to Buyers of Castings," and was co-authored by Oral K. Hunsaker, assistant superintendent, and Edwin F. Price, chief inspector, Dayton Malleable Iron Co., Dayton, O. Main presentation was moving pictures and slides with Mr. Price as narrator.

The speaker stated that quality control procedure should cover every phase of the casting process. Mr. Price said that quality control will result in less scrap, a better yield and improved and consistent quality. Of advantage to foundries is the fact that buyers of castings who utilize quality control in their own plants will not hesitate to purchase from foundries which have such control. In answer to a question concerning number of employees required to perform quality control, Mr. Price said experience of his company was about 1 quality control man to 50 workers.

An exposition on "The Practical Aspects of Shell Molding" by Wilbur S. Walters, LaGrange Shell Molders Inc., LaGrange, Ind., proved to be another conference highlight. Chairman for this portion of the program was H. L. Day, metallurgical engineer, Auto Specialties Mfg. Co., St. Joseph, Mich.

Mr. Walters briefly outlined the procedure and materials used in making, curing and pouring shell molds, then turned to characteristics of castings so made, among these being close dimensional tolerances and excellent surface finish. Cost of shell mold castings is somewhat higher than sand mold, but ultimate cost frequently is less when savings in machining time are considered.

Mr. Walters mentioned that because of minimum chilling effect of shell molds, castings are relatively soft and do not require the annealing that some sand mold castings do. Another advantage is the small degree of metal shrinkage. On the other hand, gating and risering of shell molds is just as important as in green sand molding.

Concluding conference session on afternoon of the second day was devoted to materials handling in the foundry, with K. F. Lange, sales manager, Pershing Rd. Plant, Link-Belt Co., Chicago, the speaker. B. E.

Banquet scene at the annual Purdue Metals Casting Conference. About 240 attended the two-day meeting

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1. ***Intermediate Crankcase***..33 minutes per casting saved on 120 castings per day.
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That's "nice work" if you can get it—and there's no good reason why you can't. There's a wealth of fact-reports like that one—if you're interested. Ask us.

Paid for Itself 7 Times in 14 Years . . .

Any $10 investment is a bonanza at that rate of return—but when you refer to a $60,000 installation, you're in the "Struck Oil" class.

It's a simple fact: A Hydro-Blast unit for the reclamation of used foundry sand, installed in 1938, paid for itself in two years *—and has continued that flood of savings ever since.*

Want to find out what Hydro-Blast would do to your sand costs? We have a simple little form, accurate for preliminary purposes, that will tell you right away what you can expect—you enter your own data and write your own report.

Why not let us send it to you? Costs you 3 cents for a stamp—may easily put you in the way of an impressive extra dividend.

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An aircraft engine builder tested Hydro-Blast for removing burrs, as against mechanical deburring, and recorded these facts:

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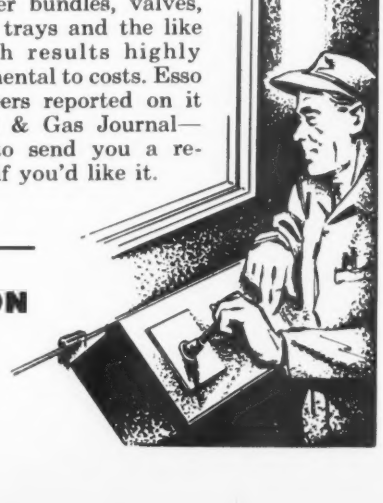
Don't raise your eyebrows at us—the figures are the manufacturer's; not ours. There's more to be said about it. We'll say it to anyone interested.

Hydro-Blast Cleans Heat Exchangers . . .

Esso Standard Oil Co. installed a Hydro-Blast unit in its "show case" refinery at Baton Rouge, for cleaning heat exchanger bundles, valves, tower trays and the like —with results highly detrimental to costs. Esso engineers reported on it in Oil & Gas Journal—glad to send you a reprint if you'd like it.



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Gavin, assistant manager, National Malleable & Steel Castings Co., Indianapolis, presided.

Mr. Lange explained that 40 to 50 per cent of the hours in foundry operation are spent in handling materials. Steps in mechanizing a foundry involve: (1) An accurate analysis of capacity to meet sales potential; (2) a survey of present equipment; and (3) a study to obtain straight-line flow. Next come development of a flow sheet layout, then a more detailed layout, and finally studies of each department separately. Through use of many slides, Mr. Lange explained good materials handling procedures.

The conference closed with a visit to the Purdue foundry laboratory, where students in the Foundry Educational Foundation program demonstrated the operation of a baby cupola. This melting equipment, designed and constructed within the past year, is about 8 inches in diameter and approximately 42 inches high. It is lined to 4-inch diameter and taps out about 10 pounds of iron per heat. Thermocouples and other instruments permit study of the melting process.

Enjoy Social Evening

Social event of the conference was a banquet on the evening of the first day. This was well attended and provided an interesting program. Some 30 students enrolled in the FEF program, now in its fourth year at the university, were guests.

Robert Langsenkamp, Langsenkamp-Wheeler Brass Works Inc., Indianapolis, and past chairman of the Central Indiana Chapter, AFS, and vice president of the Non-Ferrous Founders Society, served as toastmaster. During the dinner hour, guests were treated to music by a duo-piano team consisting of J. F. Lindley, professor of manufacturing processes at Purdue, and his son, R. W. Lindley. Immediately after dinner, a comedy team consisting of George Kenzler and "Doc" Walkey provided some lighter music and repartee directed at a few well-known foundrymen in the audience.

The dinner speaker was Dr. Alfred P. Haake, Park Ridge, Ill., economist and consultant to General Motors Corp., and in his serious message entitled "Building for Tomorrow" he re-taught a few simple laws of economics and exploded a few modern-day theories. Dr. Haake was introduced by S. D. Martin, plant manager, Central Foundry Division, General Motors Corp., Danville, Ill.

"Ideal" Steel Foundry

(*Continued from page* 107)

However, with the change to a single-shift operation and the saving of manpower, even this very large investment will be returned in savings in less than four years. Although this is a relatively long period compared with some of the other mechanization steps, it is considered satisfactory.

Improve Core Department—Provision for silo core sand storage and improved core sand handling will greatly improve coreroom operation (Fig. 21). Core sand will be handled directly from undercar unloader at the railroad siding to a bucket elevator which lifts it to silo storage (Fig. 22). A sand belt at the silo discharge level draws sand from the storage silos when it is needed in the core room. The same bucket elevator used to move sand into storage serves a dual purpose and lifts the sand from silo storage to the sand belt above the silos. This previously stored sand then bypasses the storage silos and is delivered directly to the bin above the core sand muller.

The dual use of the sand delivery equipment in this manner provides an efficient setup at a fraction of the cost of a separate delivery system. The cost of this installation will be in the neighborhood of $30,000, and although the labor saving will be relatively small—about $4000 to $6000 a year—the investment can still be paid for in approximately five years. This might not be justified except for the fact the coreroom operation will be greatly streamlined. Clumsy core sand handling jobs will be eliminated, and large capacity silo storage will permit the foundry to purchase its core sand in more economical quantities.

Conveyor Speeds Molding — In the molding departments, greatly increased efficiency can be obtained by the relatively inexpensive installation of a power conveyor to serve both the small mold production unit and the large mold unit. With all pouring done on a single conveyor, the pouring can be localized in one small area and this area can be effectively hooded.

Thus, instead of pouring over a wide area in both bays, pouring is done only at the one end of the power conveyor, and an exhaust hood is provided at this point. The pouring conveyor greatly simplifies the job of mold and flask handling. Shakeout is speeded, flask return is speeded, and the entire molding operation is streamlined. The installation will cost approximately $40,000, and even with the small labor saving made possible

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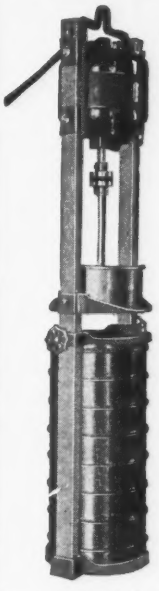

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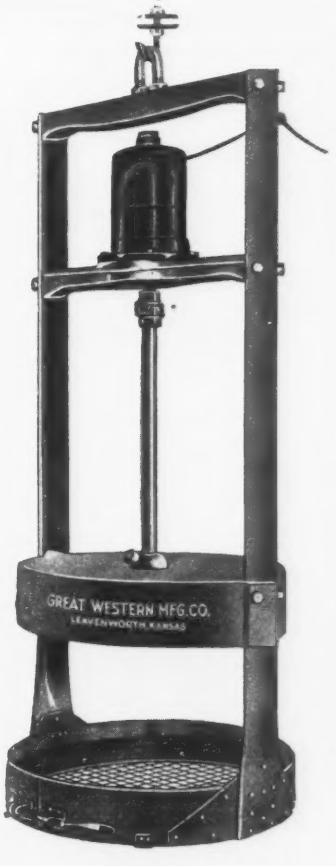

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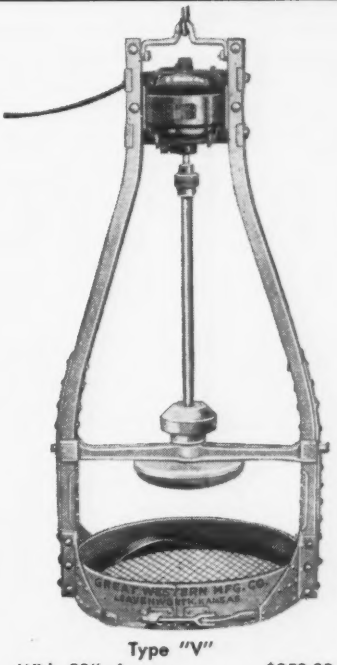

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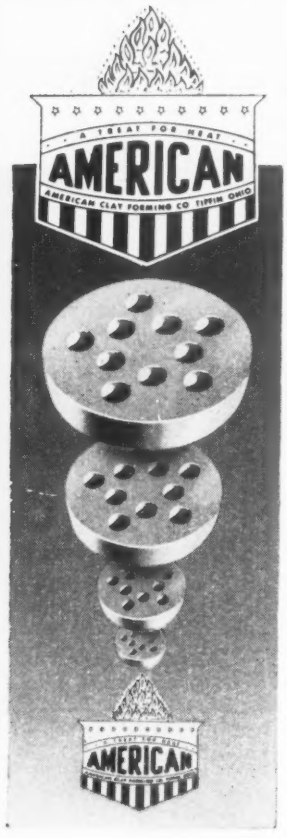

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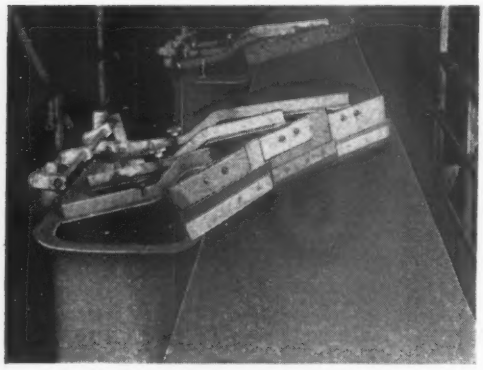

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by simplified flask handling and pouring, the expenditure is justified.

The pouring operation will still be intermittent. Small molds will be poured first, then large molds. A particular group of molds to be poured will be pushed onto the conveyor just before pouring takes place. Those molds will then be poured, cooled and shaken out, and the flasks will be returned to the respective unit before another group of molds is started onto the conveyor.

The roller conveyors on the large mold unit were originally planned to provide maximum flexibilty without a power conveyor. With the power conveyor installed, a much more efficient layout of roller conveyors is possible and is shown in Fig. 26. This arrangement permits minimum mold handling and will allow a saving of one or two men. Transfer car movement of molds from the core setting conveyor to the storage conveyors has been eliminated, and molds are simply pushed off the long conveyor onto the short ones, then directly onto the power conveyor for pouring.

Although sand recovery units of both the complete and partial types are to be highly recommended for some installations, particularly where location and cost of sand make such an installation economically advantageous, the cost might not be justified in this small steel foundry. It may be that in a future state of this foundry's development such an expenditure could amply justify itself.

Results Justify Mechanization — This then is the ideal steel foundry, or at least a stage of that foundry's development closely approaching the ideal (Fig. 27). There is yet much room for improvement, and many steel foundrymen will be able to point out important improvements that could be made. We have, how-

"So that's why Jake's been missing you at the shakeout the last half hour!"

ever, come a long way from our original layout. Let us see how the results compare with those contemplated.

A capacity of approximately 17 tons of finished castings a day, 9 tons from the small mold department and 8 from the large, has been attained. This will permit us to reach easily the required production of 300 tons a month, or 15 tons a day, and will even provide room for some expansion beyond that figure.

Twenty-four men are now employed in molding departments and 12 men in the coreroom. Forty men work in the two cleaning departments, and 12 workers handle the charging, tapping and pouring of metal. An additional 50 workers are employed on miscellaneous jobs including yard labor, crane operation, materials handling, pattern set-up, etc. Thus, a total of approximately 140 men produce 15-17 tons of finished castings each day for a total average rate of 70 man-hours per ton of good castings.

The entire job has been done with a step-by-step, pay-as-you-go program. Production continued in all departments as the mechanization progressed. Even when an installation was being made in a particular department, production there was not unduly hampered. As an example, you will remember the installation made of the turntable, hydraulically operated slinger, rollover machine, and plate feeder in the large mold bay. Also we have not gone out on a limb in any single mechanization step, since each expenditure has been made to justify itself not only on a pay-for-itself basis, but as a part of the long-range program.

The foundry has also been idealized to the extent that *all* operations are carried on during an eight-hour shift. Although this practice might be subject to criticism on the basis of failure to make the fullest use of expensive equipment, it does offer the advantages of longer equipment life and the opportunity for optimum maintenance. It is also apparent that with eight-hour operation, capacity could be doubled at any time by going to a two-shift procedure.

In these days when foundry operating profits and particularly steel foundry operating profits often rest on a hairline, planned mechanization of this type is essential. In fact, it is the only manner in which a foundry can successfully compete in our modern production economy.

Acknowledgment — The author is indebted to the Pittsburgh Lectromelt Furnace Corp., the American Wheelabrator & Equipment Corp., the

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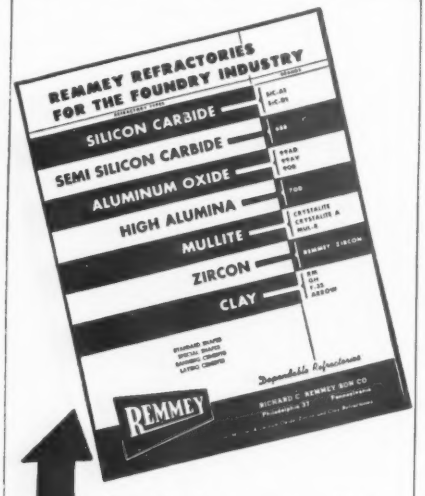

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Pangborn Corp., the American Air Filter Co., the C. O. Bartlett and Snow Co., and the Claude B. Schneible Co. for several of the illustrations used in this article.

Complete Ventilation Conference Program

Program for the second annual Industrial Ventilation Conference, Feb. 16-19, at Michigan State College, East Lansing, Mich., has been completed. It calls for a large variety of talks and demonstrations, open discussions, general sessions, classroom analysis of problems and other activities.

Industrial ventilation problems may be submitted in advance for consideration by speakers and instructors, and answers will be given during the conference.

Fee for the four-day conference is $25, including banquet and final luncheon. Other meals have been scheduled because of the limited public eating facilities in the Kellogg Center, where the conference will take place, and tickets for them may be purchased at the time of registration. Registration forms should be sent in advance, but no advance payment. Send inquiries to Industrial Ventilation Conference, Continuing Education Service, Michigan State College, East Lansing, Mich.

AFS Melting School To Be Held in Chicago

The annual melting school of the AFS Chicago Chapter will be conducted Mar. 16 to Apr. 2 at the University of Illinois' Chicago Undergraduate Division, Navy Pier, Chicago. The school again will be divided into four groups—gray iron, steel, malleable and nonferrous. Respectively, they will be headed by William O. McFatridge, International Harvester Co.; A. P. DiGirolamo, Chicago Steel Foundry Co.; Kenny P. Smith, Chicago Malleable Castings Co. and Donald L. Colwell, Apex Smelting Co.

Steel meetings will be on Mondays, gray iron on Tuesdays, malleable on Wednesdays and nonferrous on Thursdays. The steel group will meet from 6:30 to 9 p.m. and the others from 9 to 9:30 p.m.

Attendance is expected to exceed the 1300 persons who were present at last year's sessions. Director of the school will be Roy W. Schroeder, assistant professor of foundry and pattern laboratory at UIC and chairman of the educational committee, Chicago Chapter, AFS.

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THIRD SOUTHWEST REGIONAL CONFERENCE

Features Varied Technical Program

By WILLIAM G. GUDE
Managing Editor
FOUNDRY

LARGEST attendance in the history of regional foundry conferences in the Southwest marked the successful third annual gathering held at the Baker Hotel, Dallas, Tex., Nov. 13-14. About 250 participated in the two-day meeting at which, for the first time, the Tri-States Chapter of the American Foundrymen's Society acted as a co-sponsor with the Texas Chapter and Texas A & M College Student Chapter. The Texas groups sponsored the two previous conferences at Houston and San Antonio.

James R. Hewitt, manufacturers' representative, Houston, Tex., and Dan A. Mitchell, Progressive Brass Mfg. Co., Tulsa, Okla., were co-chairmen of the general committee in charge of the conference. The program, arranged by a committee headed by W. H. Lyne III, Hughes Tool Co., Houston, and Robert W. Trimble, Bethlehem Supply Co., Tulsa, included three general meetings, six sectional meetings, and two luncheon sessions. The conference was concluded with a banquet Friday evening.

Earl E. Woodliff, foundry sand engineer, Detroit, first speaker at the opening general meeting, emphasized that the availability of testing equipment and sand testing in itself do not constitute sand control. He recommended setting up specifications for new sand purchases and strict adherence to these specifications; employment of capable personnel in sand mixing and testing; use of carbonaceous additives to iron foundry sands to produce a reducing atmosphere in the molds and improve surface finish of the casting.

Core sand used should be the washed and dried type, Mr. Woodliff stated, because the advantage of moisture control outweighs the cost. Mulling time varies with the type of mixer employed; consequently, if optimum sand properties are obtained in less than the established time, it indicates too much binder is being added. Proper selection of new sand as to grain size and clay content was listed as the most important factor in sand control by the nonferrous foundry.

Discussing "Steel Molding Sand," Henry W. Meyer, General Steel Casting Corp., Granite City, Ill., pointed out that to maintain uniform sand properties is a big job once the most suitable type of mixture has been decided upon. He showed examples of castings produced and sand mixtures employed at General Steel, including an all-purpose sand used to cast parts weighing from a few pounds to 85,000 pounds. Illustrating examples of five different sands exposed to 2500° temperature for 5 seconds, the speaker pointed out that components of a sand mixture do not all affect the sand's high-temperature properties in the same way.

Pneumatic reclamation of foundry sands was described by C. E. Wenninger, National Engineering Co., Chicago, at the second general meeting. The equipment discussed causes the sand grains to be impinged by air pressure against a series of conical targets which hold a certain mass of sand within their peaks. This induces the grains to strike against other grains, removing adhering carbonaceous and bond materials. Several installations were reported in successful use, with operating cost about $1 per ton of reclaimed sand.

Three sectional meetings concluded the first day's technical sessions. At the nonferrous meeting, Ed Mooney, Federated Metals Division, American Smelting & Refining Co., Whiting, Ind., discussed methods of correcting shrinkage porosity in brass and bronze castings through proper gating and risering. Typical castings were sketched and means of attaining directional solidification explained. Mr. Mooney favors a round riser in the interest of delaying solidification of feed metal; for a given amount of metal the round riser has less area in contact with the sand than a square type.

Charles K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala., spoke before the steel group on

GRINDING WHEEL INSTITUTE MEETS: Over 100 persons attended the annual meeting of the Grinding Wheel Institute in Atlantic City, N. J., Oct. 9-11. Earl C. Hughes, left, vice president, Bay State Abrasive Products Co., was elected chairman of the board of directors, succeeding George F. Kohn, president, Precision Grinding Wheel Co., Philadelphia. H. Paul Floyd, right, vice president, Waltham Grinding Wheel Co., Waltham, Mass., was re-elected president of the Institute, and Clarence E. Etheridge, secretary, Macklin Co., Jackson, Mich., was re-elected vice president

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"Some Aspects of Steel Melting Practice." He discussed the influence of melting operations on such properties as tensile strength, ductility, hardness and impact properties, and touched on some of the experimental work done with boron and cerium additions. The gray iron sectional meeting had Ralph Beardon Great Lakes Carbon Co., St. Louis as speaker, his talk comprising a review of various fundamentals connected with cupola operations.

"Standards for Use in Cost Analysis" was the first subject at the third general meeting, and was presented by William Busby, Texas Foundries Inc., Lufkin. Pointing out that standards are essential for comparative purposes in cost reduction efforts, he described a method by which cost of different operations are analyzed, standards are established, and charts are prepared which provide a ready comparison with current costs.

An inspirational address entitled "Human Engineering" was presented by William M. Ball Jr., R. Lavin & Sons Inc., Cincinnati. He declared that we are spending considerable for the development of materials and machines but give relatively little attention to human engineering, which he described as offering great opportunities for savings and improved efficiency in industry. Man failure, he maintained, is one of the greatest causes of casting defects.

At the concluding technical sessions, Herman J. Pfeifer, Electro Metallurgical Co., Houston, spoke before the gray iron group on the practical application of various ferroalloys to cupola metal. Harry G. Schlichter, Beardsley & Piper, Division of Pettibone Mulliken Corp., Chicago, addressed the steel session on "The Ideal Steel Foundry." This paper appears in two parts in the December and current issues of FOUNDRY.

Common causes of aluminum casting defects were explained at the nonferrous session by D. L. LaVelle American Smelting & Refining Co. Perth Amboy, N. J. Inclusions usually are aluminum oxide, he said, while iron picked up from the melting pot through improper coating causes a brittle structure in the metal. Pinhole porosity caused by entrapment of hydrogen gas, shrinkage resulting from inadequate gating, and pits near the casting surface as the result of clay balls in the sand were other defects illustrated and discussed. Poor pouring practice causes a large percentage of aluminum cast-

ing defects, he said.

Mr. LaVelle recommended use of a rectangular-shaped sprue to prevent swirling metal and air pickup, using a choke at the bottom without a basin, and putting gates in the cope and the runner in the drag. The riser should be round.

Israel Smith, Western Foundry Co., Tyler, Tex., and Texas Chapter vice chairman, presided at the first luncheon meeting and presented AFS Vice President Collins L. Carter, president, Albion Malleable Iron Co., Albion, Mich. Mr. Carter gave a most informative review of recent and current activities of the national association.

Lloyd G. Berryman, Texas A & M College, and Robert W. Trimble, Bethlehem Supply Co., were co-chairmen of the second luncheon meeting. F. H. Kobely, Columbia-Geneva Steel Division, United States Steel Co., San Francisco, spoke on "Safety and Accident Prevention." The 94 per cent reduction in accident frequency in U. S. Steel plants the last 40 years, he said, has necessitated development of a procedure termed "single objective safety" to lower the accident rate further. This involves a close analysis of both major and minor accidents which frequently can be prevented by a change in worker procedure rather than by correcting a hazard in operating equipment.

While top management must be sold on the importance of safety to make accident-prevention programs a success, Mr. Kobely said experience shows a definite relationship exists between number of accidents and the degree of activity in the individual plant's safety work, such as number of safety meetings, number of unsafe conditions reported, etc.

Concluding the meeting was the showing of the Claude B. Schneible Co.'s film, "The Invisible Shield," depicting the use of various types of dust control equipment in the foundry industry.

Social events of the conference, in addition to a ladies' entertainment program, included the traditional Texas barbecue Thursday evening. This was followed by entertainment furnished by the Lone Star Steel Co.

P. B. Croom, Houston Pattern Works, and Texas Chapter Chairman, presided at the banquet Friday evening concluding the conference. An entertaining talk replete with wit and wisdom was given by L. E. Throgmorton, vice president, Republic National Life Insurance Co., Dallas.

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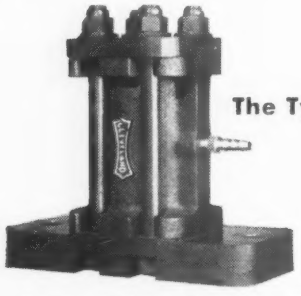

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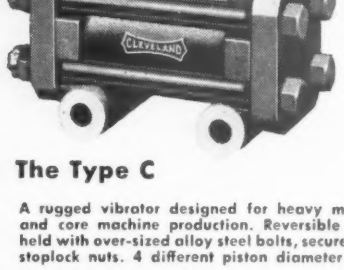

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Snagging Operations

(*Continued from page* 113)

snagging, rough skin, flash, fins, etc., on the work can increase the ease of removing poundage and thus reduce the "K" value.

To arrive at more accurate estimates of the power required for various rates of cut on a specific job, the following simple procedure is recommended. Operate the machine to get a typical, steady, measured rate of cut. At the same time, measure the wattage input to the motor that drives the wheel. For any other prospective rate of cut, multiply the power just measured by the square root of the ratio of rates of cut.

For example, suppose the initial rate of cut is 10 lb per hour and the initial power is 4 kw. For a stock removal of 15 lb per hour, the estimated power would be 4 kw $\times \sqrt{15/10} = 4 \times 1.225 = 4.9$ kw, or 4.9 hp at grinding contact.

Other circumstances which affect "K" are as follows:

1. A larger wheel diameter will raise the "K" value and a smaller diameter will lower it slightly, because the arc of contact is affected.

2. A smoother (more glazed) wheel face will raise the "K" value and a sharper face will lower it.

A "K" value as high as 2.2 has been obtained with a 24-in.-diam "slick" (dulled) faced resinoid wheel and a value as low as 1.5 with a 16-in. fast wearing (sharp face) resinoid wheel. Both were on swing frames running at about 9000 sfpm, grinding steel.

Incidentally, a "slick," dulled wheel face does not normally increase the power or the heat generated at the same grinding pressure. It tends to make "K" come high because of the low rate of cut.

Sharpness of wheel face depends mainly upon rate of wear, which in turn is dependent upon grade of wheel and the manner of usage. Grinding pressure can affect the "K" value indirectly through direct effect upon rate of wheel wear, when the grade of wheel remains constant.

3. If the wheel face is kept square rather than rounded and if the work surface is flat, the "K" value will be higher because of the greater area of contact.

Power requirements for four different operations are graphed in Fig. 4. Values for the graphs were calculated from formula (6) and from "K" values in Table II.

Pressures Involved—To get a faster rate of cut with a given wheel, it is obvious, a heavier grinding pressure is required. Pressures for different rates of cut can be calculated by an

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empirical method.

Take formula (2) and substitute the equivalent of "Hp" from formula (6). The result is:

$$P = 33{,}000 \times K\sqrt{M}/(CS) \quad \ldots\ldots (7)$$

(Formula (7) is for speeds as specified for formula (6).)

Using values of "K" and "C" from the tables, values of "P" (pressure) have been calculated for a range of rates of cut for each of four kinds of grinding and plotted on Fig. 3.

Pressures according to formula (7) and as read off the curves come within the ranges of those determined in laboratory experiments.

Determining Rate of Cut—If it is desired to calculate approximate rates of cut practicable with a specified power or under a specified pressure, Figs. 2 and 3 may be read in reverse, or one of the following formulas may be used.

For resinoid wheels,

$$M = Hp^2\sqrt{9000}/S/K^2 \quad \ldots\ldots (8)$$

For vitrified wheels,

$$M = Hp^2\sqrt{6000}/S/K^2 \quad \ldots\ldots (9)$$

For all wheels, when speeds are as specified for formula (6),

$$M = (PCS)^2/(33{,}000\,K)^2 \quad \ldots\ldots (10)$$

Factors Involved—It is emphasized that "M," the rate of cut, is for contact time only and is different from rate of cut based on overall time. For example, if the overall rate of cut is 15 lb per hour and actual grinding contact is only 75 per cent of the overall time, "M," the contact rate of cut, is 15 divided by 75 per cent, or 20 lb per hour.

The "C" and "K" factors used in this article are for aluminum oxide abrasive on soft steel and annealed malleable iron, and for silicon carbide abrasive on gray and hard cast irons.

A few examples to illustrate how the preceding formulas and constants apply, are worked out and presented in Table III. Some of the calculated figures are rounded off after the first two or three digits.

Power and pressure figures in the first two data columns of Table III are the same as those read off the curves of Figs. 2 and 3. Such figures in the last two columns cannot be read off directly from the curves because different wheel speeds were assumed for the table and the curves.

Economy of Grinding Operation—Economy is somewhat outside the scope of the present article. However, some notes concerning it should be of interest here.

Economy is increased when the total grinding cost per unit of product is decreased. Within limits, this grinding cost is reduced by raising the pressure between wheel and work. Limits are capacity of equipment, operator fatigue and inability to properly control the work or the machine

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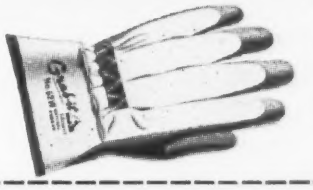

Tough, flexible and positively non-slip natural rubber coating, bonded to extra sturdy all-white fabric base. Far outwear ordinary canvas and leather gloves.

"Grappler" plastic coated gloves far outwear leather, other plastics

Perfectly shaped to fit the hand and coated with DUROX, a new reinforced plastic extremely resistant to abrasion, oil and coolants. Permanently flexible. Note wing thumb and curved, pre-flexed fingers.

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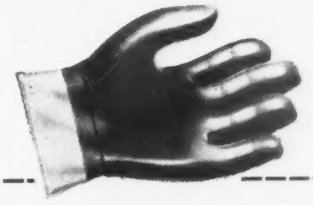

Same wing thumbs and pre-flexed fingers as "Grappler" gloves. Fit the hand all over — no bagginess. Brown plastic coating is second only to "DUROX" in wearing quality and grip.

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and thereby utilize a faster rate of cut. Also, heavier pressure calls for a harder grade of wheel.

Heavier pressure can lower the ratio of material removed to wheel wear. However, the saving in time cost more than overbalances the additional wheel cost per unit of product ground.

Less power drawn by vitrified wheels than by resinoid wheels for the same rate of cut does not mean that the vitrified bond is the more economical for stock removal of soft steel. The opposite is decidedly true in most cases. Power cost is but a small part of total grinding cost.

One reason why the resinoid power curve is higher than the vitrified (swing frame) curve on Fig. 2, is the higher wheel speed. Another reason is that for the same rate of cut with typical grades, the resinoid wheel wears more slowly, making it less sharp and requiring more power.

Figures used for gray cast iron assume silicon carbide as the abrasive because it is generally recommended. Incidentally, however, laboratory results from grinding the interior body of this metal show aluminum oxide abrasive more economical. At the same pressure and same rate of wheel wear, the aluminum oxide cuts faster. This difference between normal recommendation and finding in laboratory grinding may be due to the nature of the skin on castings, which, in commercial grinding, must be removed.

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Aluminum Smelter Begins Operation in Missouri

The first two wings of a new aluminum smelter have been opened for full production by the new American Alloys Corp., 805 Waltower Bldg., Kansas City, Mo. Located on a 6½-acre site, the plant is equipped with modern smelting and refining equipment. Its laboratory contains spectrographic, photometric and chemical equipment for quality and analysis control.

The corporation is engaged in the production of primary and secondary aluminum casting alloys and in the manufacture of a new, high-strength aluminum-magnesium alloy. General manager is Thomas E. Kramer, former sales manager of W. F. Jobbins Co., Aurora, Ill. Other officials include John A. Benson, manager of remelt ingot sales, and William A. McKnight, director of scrap purchases and in charge of plant production.

Casting Design

(*Continued from page 97*)

toward attempts to correlate or improve existing methods of calculating to make them agree with actual practice. This is an important point that needs more attention and a lot more interest than it has received in the past.

These are probably the main features requiring emphasis. Now let us illustrate them with one or two fairly simple cases about which sufficient knowledge now exists to enable us to predict results accurately.

A simple part with which a lot of work has been done, and which illustrates the main point very well, is a wrist pin for internal combustion engines. Fig. 5 illustrates the design and loading assumed in the case to be examined. Since all pistons in lightweight engines are made of aluminum, they are very flexible. Consequently, the analysis assumes that the load from the piston to the pin is practically a concentrated load. Some argument might exist about that assumption, it is true, but it is important to have some method of analysis that can be compared with the actual results. Experience may then make it possible to predict the next job quite accurately.

Load Is Distributed

If lightweight loading is desired, a short wrist pin in the connecting rod is employed to make it rigid. Hence it is possible to assume that there is a distributed load over this portion of the connecting rod. With this form of loading, it is easy to set up the calculation of a beam supported at the end and uniformly loaded over a certain area in the middle and to obtain stresses for the range of load applied.

Let us assume that, as a result of such a calculation, there exists a tensile and compressive stress of 25,000 psi because of the firing pressure and a tensile and compressive stress of 10,000 psi because of the forces of inertia in a direction opposite to the firing force. This means that when the cylinder fires, 25,000 lb tensile stress exists in certain fibers of the material and that on the next upstroke the inertia of the parts is bending the pin in the opposite direction. Thus the same set of fibers of material is now subjected to a compression of 10,000 psi. There are the calculated stresses.

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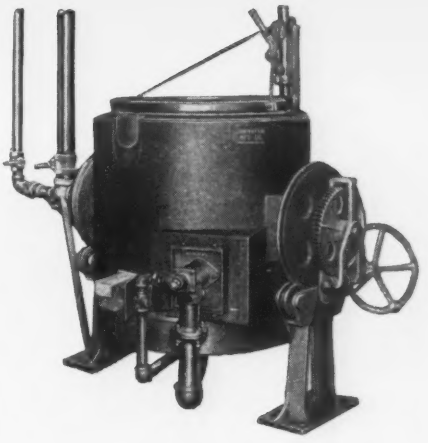

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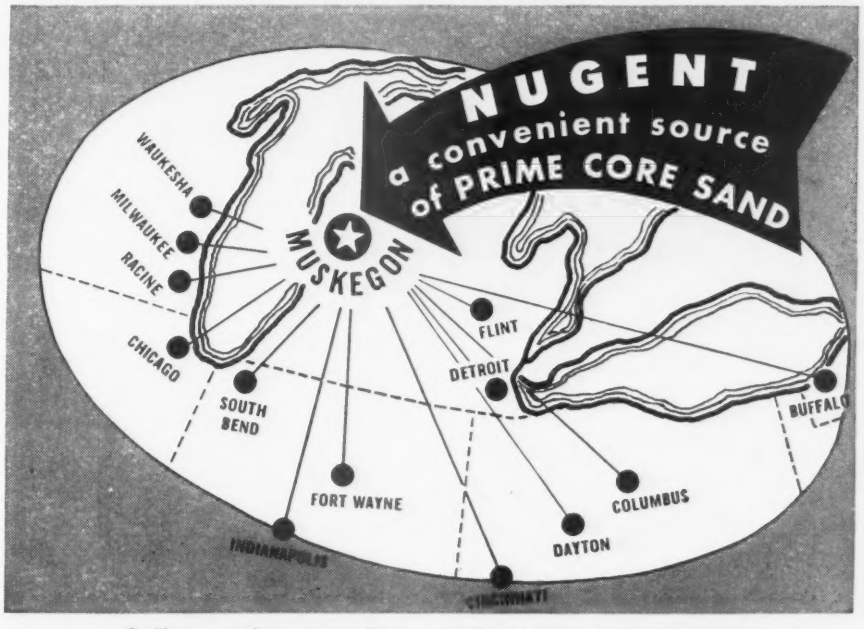

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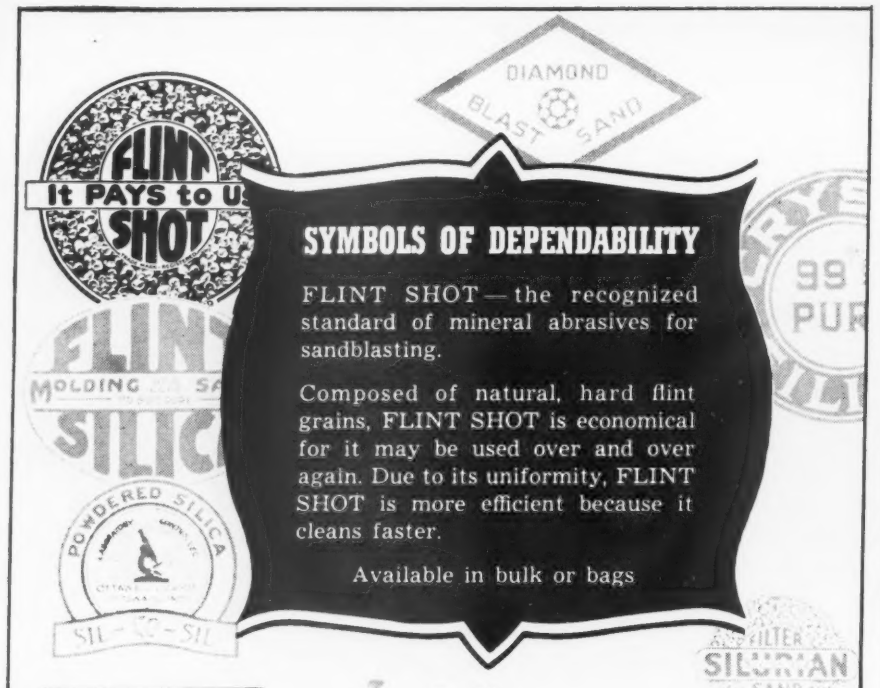
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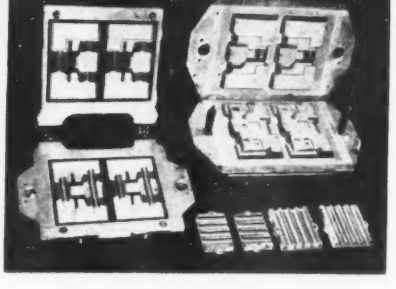

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Pressure Cast PRODUCTS

They don't mean anything by themselves.

In general, the designer is interested in how light this part can be made and still work. To this end he should know the actual stresses. As already indicated, the actual stress is going to depend upon the manner in which this part was made. Wrist pins are usually made of hardenable steel, case hardened on the surface and sometimes hardened all the way through. They are ground and usually lapped afterward, with a highly polished surface. Careful examination will show, however, that they are still covered with slight scratches created during production. It is necessary then to design this pin for the worst scratch that is likely to be encountered in this method of production.

In a 12-cylinder engine, there are 12 unequally smooth wrist pins. One or another is likely to have relatively deep scratches in it. The question is what is the stress of concentration resulting from that kind of scratch in that method of production. In comparing a lot of engines, the writer decided that the concentration was about 2 to 1. Therefore the actual tensile stress is likely to become 50,000 psi and the compressive about 20,000 psi, as a result of stress concentrations resulting from the method of production.

Examine Fatigue Diagram

Turning back to the fatigue diagram, we see that the mean actual stress is $(50{,}000 - 20{,}000) \div 2$, since compressive stress is negative on the diagram. So plot at point *D* where the mean stress is 15,000 psi, point *E* at 50,000 psi and point *F* at 20,000 psi. If, as shown in Fig. 6, these points are 10 per cent inside lines *AB* and *AC*, representing the limits of the material, that wrist pin will stand up, and the design will have just about the minimum weight possible.

The writer has used this method for a long time, and during the early part of World War II had occasion to check a large number of engines, including most German aircraft engines, the Rolls Royce and a number of American engines with this method. Despite the many different design methods that probably were used, this method of calculation gave stress concentration factors determined from the known sizes of from 1.96 to 2.12. That is considered a rather narrow range of stress for

that many different kinds of aircraft engines, all of which had been subjected to considerable development. Hence the 2 to 1 factor looks fairly good.

Taken at its face value, this simple calculation proves that because of surface finish, a 2 to 1 stress concentration is probable with this method of calculation. But in a broader sense the actual stress concentration may be only 1½ to 1, with the other portion of the factor due to error of unknown magnitude in the assumed method of loading and the other assumptions. It is, however, a method that applies and that seems to work well.

Compare Safety Factors

All of this is a relatively simple illustration. The conventional safety factor, not the actual safety factor, is more like 4 to 1 if the calculated stresses are employed. The actual safety factor is about 10 per cent.

Now let us consider a complicated casting. It is possible in this instance that severe stress concentrations will occur in certain places. The main point is that it is necessary to determine—preferably by calculation, since that is cheaper—what the stresses and stress concentrations are likely to be. Various studies enable the writer to suggest that the factors given in the table below give fairly good results. It is important, however, to remember at this point that foundry practice will have an effect upon stress concentration proportionate to how free from surface defects and other imperfections the stressed surfaces can be kept.

Method of Production	
Grind and polish	1½ to 2
Grind	2 to 2½
Smooth machine finish	2¼ to 2½
Rough machine finish	2¾ to 3½
Regular practice cast or forged material	3 to 4

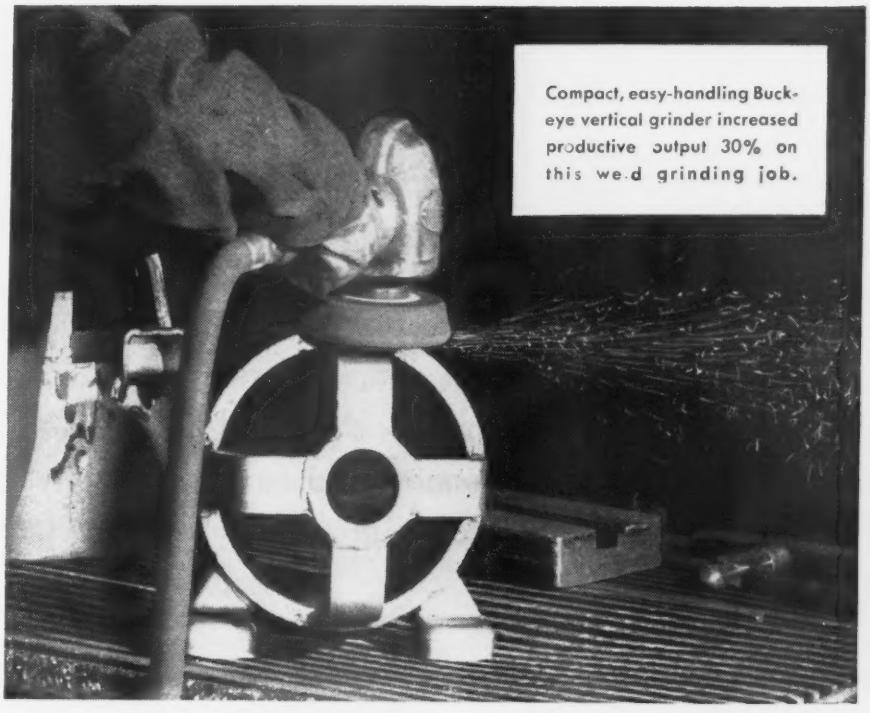
If it is possible to set up some theoretical method whereby it is possible to calculate a stress in the part with reasonable accuracy, then with the aid of stress concentration factors of about the above order, it is possible to predict fairly well the actual results in the casting itself.

The designer needs to do the following things:

1. Carefully analyze the situation to produce a logical method of stress calculation which will approximate to a maximum degree the method of loading actually encountered.

2. Consider ways in which the

▶ increases output 30% on grinding operations



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All of which proves it's very important to select the right tool for the job—and very expensive to go on using older, less efficient tools.

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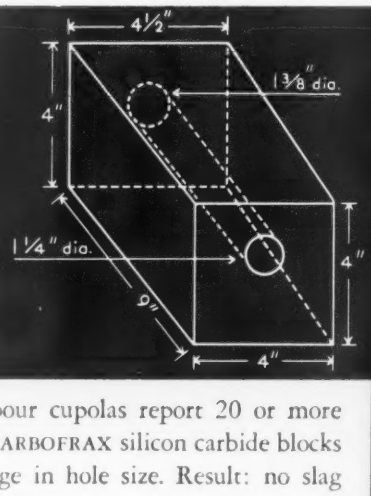

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stress fluctuation in the parts can be decreased to a minimum by design, construction or assembly. It is possible actually to reduce stress fluctuations by assembling techniques.

3. Design to reduce stress concentrations as much as possible.

4. Estimate the stress concentration factor likely to be encountered in the final design.

5. Carefully select material for the part and modify the design, if necessary, to obtain the maximum performance from such material. (The technique that is applicable to cast iron is not necessarily applicable to aluminum, etc.)

6. Consider the relative stiffness of adjacent parts and adjust the design accordingly, so that the two parts are capable of working together despite the varying deflections involved.

7. Check actual stresses in the parts under simulated operating conditions before assembly in the final machine, if at all practical, since a failure in operation can be costly.

Employ Strain Gages

Let us take the internal combustion engine for illustrations. New aircraft engines cost huge sums today, and their development requires the use of strain gages, brittle lacquer, extensometers and any other method of finding the actual stress in parts before test and possible failure. It is thus common practice to fit the important parts subject to high stress with strain gages and other test devices and to subject them to the calculated loads in order to obtain estimates of actual stresses before assembly of the parts. The points at which such strain gages can or should be applied can be located by brittle lacquer techniques.

Fig. 1 shows the Continental 1430 engine, developed during the war for aircraft propulsion and believed to be the lightest weight reciprocating engine ever produced in America. Unfortunately, it came along just as the jet engine appeared, and it was displaced by the new type. This particular engine developed 2500 hp with water injection from 1430 cu in. of displacement and weighed about 1450 lb. Accordingly it weighed about 0.6 lb per hp, even though water cooled. An inverted V-engine, it passed a type test at the regular output of 2100 hp. The crankshaft center line is at the top, and the cam box is hanging at the

bottom of the assembled engine.

Fig. 2 represents a concept of what can be done with correct design techniques, material and processing. Endurance strength can be made 100 per cent with good design, good material and good processing. It is estimated that with average design, good material and good processing, only about 50 per cent of the maximum possible can be achieved. If average design, good material and poor processing are combined, only about 10 per cent of the ultimate is achieved.

Fig. 3 shows the allowable stress range for certain materials. The effect of surface finish on an SAE 4340 forged crankshaft is shown. It can be seen that the stress fluctuation is reduced from about 70,000 psi to about 20,000 psi by poor surface finish. Surface finish is also important in a casting. Other materials are also illustrated in Fig. 3.

New Design Weighs Less

Fig. 10 shows the rocker box cover of the Continental engine. The view at left with the deep ribs is the rocker cover as it was originally designed. With this plentiful ribbing a maximum stress of 7900 psi was measured when the part was subjected to the forces that would be imposed by engine operation. The deep ribs were removed by flattening out and flaring the material into the general casting, as shown at the right. As a result, stress was reduced to 3500 psi, and the new casting weighs less than the original despite the reduction of stress.

Fig. 11 shows stress distribution in both designs. The original ribs stiffened the casting, but failure resulted. It is easy to tell why. The engine was supercharged to about 96 in. of mercury. The cylinder pressure ran up to a peak value of about 1800 psi. The crankcase is aluminum, and the cylinder walls were very thin steel with a thin steel water jacket around the outside. Thus when one cylinder fired and suction or exhaust pressure existed in the adjacent cylinders, the firing cylinder moved away from the crankshaft an appreciable amount. In other words, some cylinders were holding the rocker box down into almost its unstressed position, but the rocker box at the firing cylinder had to jump up quite a bit, for despite the ribs it wasn't stiff enough to hold the cylinder down and in place.

When change of design provided a relative flexibility between the parts,

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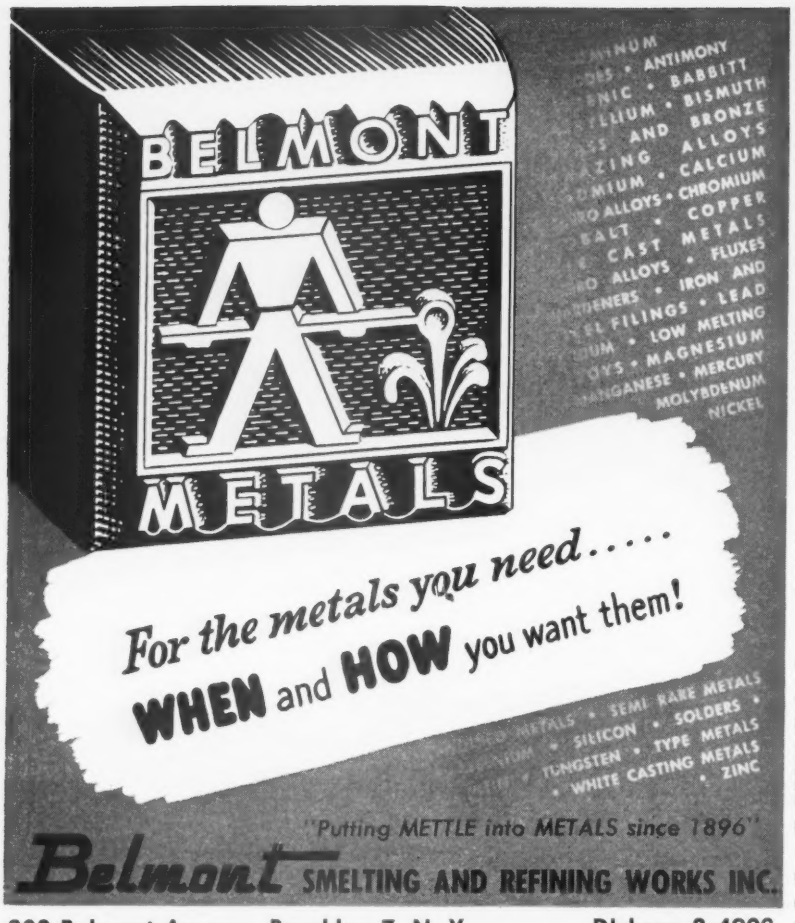
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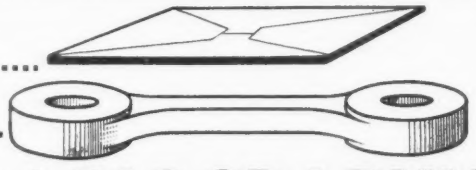

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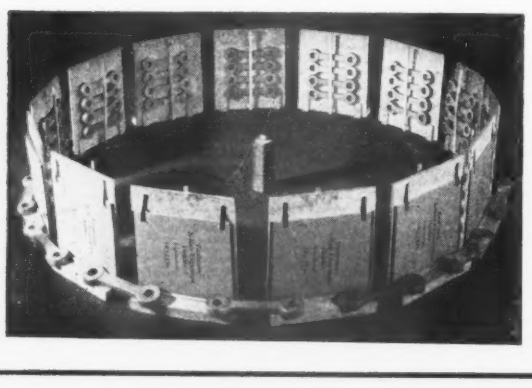
Illustration shows 60 steel castings being photographed simultaneously. The gamma rays, flying in all directions, go through all the castings at once, making 60 exposures of the 60 castings



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the result was a lighter casting with less stress that could do the job the heavier, ribbed original could not. At the same time the new casting improved technique for the foundry. The rocker box illustrates a combination of good design, casting and material, all working together to produce a better, lighter job.

Fig. 7 shows another example, a bearing cap. It was first made of a forged piece of aluminum machined from the solid as shown and gave much greater tensile strength than any cast aluminum. To provide bosses for the bolts, it was necessary to spot face as shown. The result was a crack, which started despite the provision of a radius, as can be seen in Fig. 7B. The design was changed to call for a casting, some ribbing and other strengthening added and a boss provided for the bolt. The cap still broke, as shown in 7A.

A redesign, in Fig. 7C, brought the boss for the bolt up high, as indicated. The use of brittle lacquer proved that the stress flow had been improved and that the high stress concentrations due to the change of section had been removed. Rearrangement of the bosses enabled this cap to stand up without any difficulty at all.

Lacquer Indicates Stress

Fig. 8 shows the crankcase. Brittle lacquer indicated the possible points of maximum stress, and strain gages demonstrated that the actual maximum stressing of this part was about 6500 psi. The sections were pretty heavy, and again there were many ribs.

The modification is shown in Fig. 9. The walls are thinner, and the deep ribs have disappeared. They have been made quite shallow and flattened out so that they merge gradually into the main body of the casting. The resultant maximum stress was 3300 psi, or about half the previous figure. This crankcase weighed less than the first, yet was considerably stronger.

Fig. 12 illustrates one of the techniques for testing highly loaded parts before they are put into an engine. This view looks on the inside of the casting forming the nose end of the engine and carrying the gears and propeller shaft. The method of applying torque to the casting by two hydraulic jacks and a pump can be seen. Again brittle lacquer shows the zones of stress concentration, from which the im-

portant points of stress concentration can be determined. This test also permitted an estimate to be made of how effective the tooth mesh of the reduction gear would be in operation—a very important point when high horsepower is transmitted through a reduction gear weighing only a few pounds.

Thus the setup shown permitted checking the casting for stress and strength and at the same time provided a check for deflection to insure that when the load came on, the two tooth surfaces would always be in contact across the whole face.

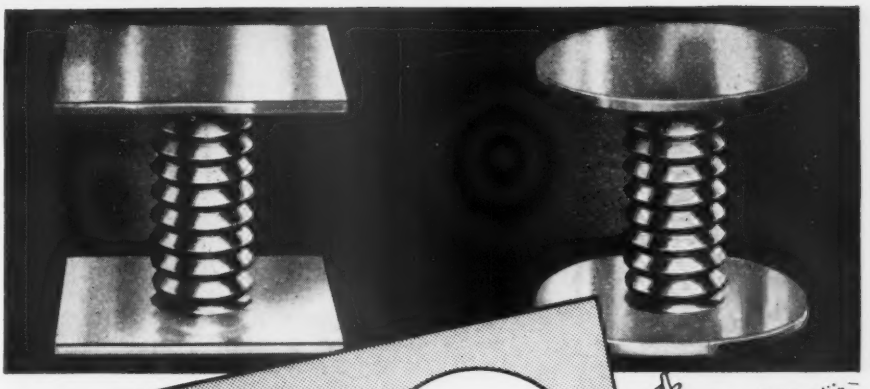
The preceding gives some idea of developments up to the present time. The state of the art is far from satisfactory, and there is a long way to go before it will be possible to put all calculations on such a basis that the answers can be relied on. If a system is developed, however, that is sufficiently accurate for calculating stresses as the result of careful analysis, study of experimental results and the relation of them to the calculated stresses, a point will have been reached that will permit the designer to be pretty certain of his design before it is run. To repeat an earlier observation, it is a lot cheaper to use paper and pencil than to use the material itself. That is the direction in which we must head for continued progress.

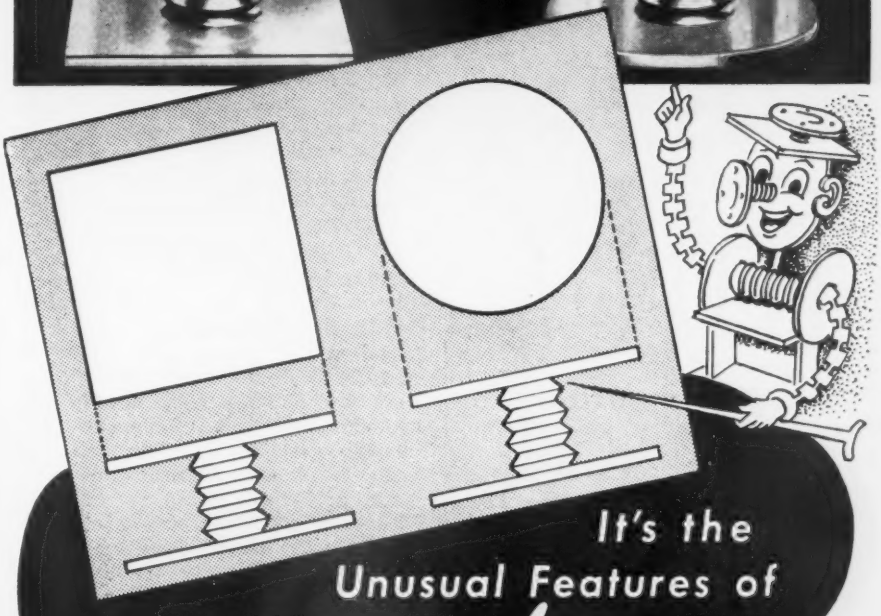
Color Film Describes Metallizing Process

Metallizing Engineering Co., Long Island City N. Y., recently completed a 16-mm sound film in full color describing the metallizing process and demonstrating practical applications.

It shows how worn and damaged cranks, shafts of various kinds, inside diameters of parts and press fits can be restored to service at savings by the metal spraying process. Use of metallized aluminum and zinc for the protection against corrosion of storage tanks, bridges, trestles, degreasers and other iron and steel work is also covered.

Suitable for presentation to industrial, professional and educational groups, the film is designed to promote a broader understanding of the nature of metallizing, its principles and its practical applications in industry. Running time is 28 minutes. Inquiries about the film should be addressed to R. J. McWaters, Metallizing Engineering Co., 38-14 Thirtieth St., Long Island City 1, N. Y.





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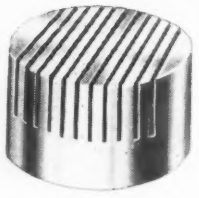
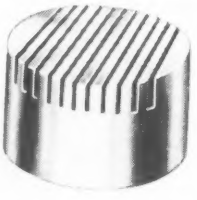


X-TRA DEEP HEAD
.156 Wide Slots
.014

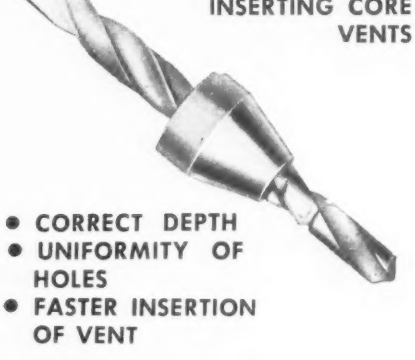
DEEP HEAD
.093



SHALLOW HEAD
.031
Wide or Narrow Slots
.014 .010

INSERTING DRILL

MOST ECONOMICAL METHOD for INSERTING CORE VENTS



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- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT

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...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 239

PLANT SURVEY: Wheeler-Brady Inc., 15017 Detroit Ave., Cleveland 7—Booklet contains comprehensive survey of materials handling which takes up such subjects as materials handling principles, materials handling equipment, changing existing methods, planning a new layout, warehouse and storage, increased capacity, product protection, safety, morale, obtaining better service, increasing operating efficiency and lowering costs.
For More Details Circle No. 91—Page 239

BAND SAWS: Wells Mfg. Corp., Three Rivers, Mich.—Catalog G-52 deals with the advantages offered by metal cutting band saws, both wet and dry cutting. Pertinent information, including design details and specifications, is given about various types and sizes of band saws. A table helps users select the right blade and right speed for a given job.
For More Details Circle No. 92—Page 239

PRECISION INSTRUMENTS: Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Wayne & Windrim Aves., Philadelphia 44—Catalog 1520 contains factual information concerning noncontrol precision instruments which employ a potentiometer, Wheatstone bridge or other measuring circuit to measure temperature, pressure, flow, pH and other variables.
For More Details Circle No. 93—Page 239

CORE BLOWERS: Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Bulletin 5000 contains 26 large pages of information about the company's large and small core blowers and stationary and portable sand mullers. Included are specifications and illustrations. A two-page section devoted to tips on core blowing opens the bulletin.
For More Details Circle No. 94—Page 239

THERMOCOUPLE PARTS: National Carbon Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Catalog section S-6169 contains data concerning such graphite thermocouple sheath parts as standard taper plugs, threaded end bushings and sleeves. This equipment is used for the thermocouple measurement of steel bath temperatures.
For More Details Circle No. 95—Page 239

HYDRAULIC CYLINDERS: Miller Motor Co., 2040 N. Hawthorne Ave., Melrose Park, Ill.—Illustrated bulletin H-104G gives complete engineering, design, construction, mounting and dimensional data covering company's complete line of square-design hydraulic cylinders for 2000-3000 psi operation. Air cylinder bulletin A-105G presents complete engineering, design, construction and mounting data covering 13 different mounting styles in 1½ through 14-in. bores.
For More Details Circle No. 96—Page 239

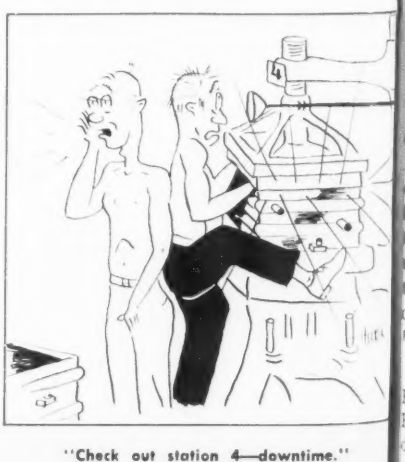
INDUSTRIAL FANS: Westinghouse Sturtevant Division, Westinghouse Electric Corp., Dept. T-415, 200 Readville St., Hyde Park, Boston 36—Booklet SA-6873 describes 11 sizes of new industrial fans and their standard wheels. Data presented involve performance and dimension specifications, applications, accessories and other information.
For More Details Circle No. 97—Page 239

DUST CONTROL: Pangborn Corp., Hagerstown, Md.—Booklet in two sections illustrates the company's line of small "standard units" for blast cleaning and dust collection applications. Each section lists significant industrial applications, recommends proper equipment for each and illustrates various models of equipment.
For More Details Circle No. 98—Page 239

CHAIN HOISTS: Harrington Co., 17th & Callowhill Sts., Philadelphia 30—Bulletin P-5 contains description of special features, complete specifications and prices of the organization's lightweight chain hoists.
For More Details Circle No. 99—Page 239

GRAPHITIZATION OF IRON: Vanadium Corp. of America, 420 Lexington Ave., New York 17—Folder discusses the company's silicon, titanium and calcium alloy for use as a graphitizer and deoxidizer. Covers its functions as chill reducer, deoxidizer and inoculant.
For More Details Circle No. 100—Page 239

WIRE ROPE SLINGS: Rochester Ropes Inc., Culpeper, Va.—Wire rope sling handbook contains 108 pages, many illustrations and a convenient index. Important types of slings are illustrated and discussed as to ap

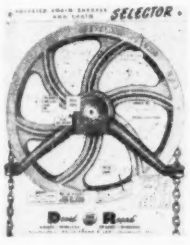


"Check out station 4—downtime."

plication; charts and tables provide useful information; a special section shows how to gage, seize and splice wire rope.
For More Details Circle No. 101—Page 239

GRINDING BANDS: DoAll Co., Des Plaines, Ill.—Bulletin 49-180 describes the firm's grinding bands used on band machines to machine very hard materials such as hardened steels and abrasive materials such as glass, marble and granite. Includes ordering information.
For More Details Circle No. 102—Page 239

SHEAVE SELECTOR: David Round & Son, Box 883, Cleveland 22—A "selector" is offered as a buying aid to purchasers of pocketed chain sheaves and guides, grooved idler sheaves and chain. Device includes all specification data required to order such products, which are used for operation of overhead valves, heavy overhead doors and certain types of power drives and hoisting equipment.



For More Details Circle No. 103—Page 239

AUTOMATIC LUBRICATION: Trabon Engineering Corp., 1814 East 40th St., Cleveland—Bulletin 529 is intended for the use of anyone interested in the planning and engineering of centralized lubrication. It contains information about the company's patented automatic lubrication systems and an engineering description of technical methods of operation.
For More Details Circle No. 104—Page 239

X-RAY SUPPLIES: Keleket X-ray Corp., 234 West Fourth St., Covington, Ky.—Company catalog for 1953 lists a wide range of x-ray supplies essential to industrial radiography. Items covered range from a stirring rod used to mix developing solutions to lead building blocks used to build special x-ray rooms. Request copy on business letterhead.
For More Details Circle No. 105—Page 239

MACHINE TOOLS: South Bend Lathe Works, South Bend 22, Ind.—Catalog 5205 contains 88 pages of descriptions and specifications of the company's complete line of machine tools and accessory equipment.
For More Details Circle No. 106—Page 239

FORK LIFT TRUCKS: Towmotor Corp., 1226 E. 152nd St., Cleveland 10—Brochure describes the various components of the company's fork lift trucks and shows what they contribute to the operation of the whole unit. Illustrations and diagrams help to explain the text. Some space is devoted to uses of fork lift trucks.
For More Details Circle No. 107—Page 239

INSPIRATORS AND BOOSTERS: Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.—Catalog 806A describes the company's latest types

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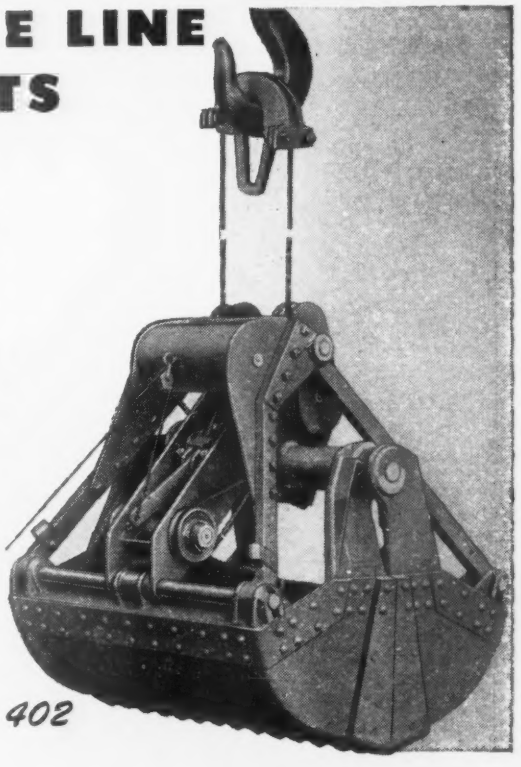

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and sizes of high-pressure gas-air inspirators and boosters for industrial furnaces, ovens, kilns, driers and similar equipment. The 6-page illustrated publication contains specifications, suggestions for application and other material.

For More Details Circle No. 108—Page 239

MAGNET REEL AND TAGLINE: McCaffrey-Ruddock Tagline Corp., 2131 East 25th St., Los Angeles 11—Illustrated two-color, 16-page bulletin explains how the firm's magnet reel and tagline can help users of traveling or overhead cranes to step up efficiency on all magnet operations in foundries, steel plants, scrap yards and other industrial locations.

For More Details Circle No. 109—Page 239

BUSHING: J. G. Jergens Co., 11106 Avon Ave., Cleveland 5—Catalog with cutaway illustrations, drawings, applications, dimension sketches and specification tables describes new pilot bearing bushing. Manufacturer says this bushing seals against coolants and powdered dust and grit.

For More Details Circle No. 110—Page 239

OPTICAL INSTRUMENTS: Bausch & Lomb Optical Co., 650 St. Paul St., Rochester 2, N. Y.—Brochure describes seven types of optical instruments, such as contour measuring projectors, stereomicroscopes, toolmaker's microscopes and thickness gages, that aid production and quality control in industry.

For More Details Circle No. 111—Page 239

ELECTRICAL MACHINERY: Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10—"Quick reference" bulletin describing and illustrating the company's principal products is available for persons interested in motors and related in-plant power transmission equipment.

For More Details Circle No. 112—Page 239

METAL SAW: North American Products Co., 3100 West Cherry St., Milwaukee 8—Catalog illustrates and describes new carbide-tipped metal slitting and slotting saw. Contains all pertinent information regarding operating characteristics and applications.

For More Details Circle No. 113—Page 239

CUTTING TORCHES: K-G Equipment Co., 1744 Lehigh St., Allentown, Pa.—Catalog sheet describes and illustrates company's general purpose cutting torches, torches for occasional cutting jobs and cutting tips. Sheet includes a cutting table for the firm's standard tips.

For More Details Circle No. 114—Page 239

LIFT TRUCK: Port-A Lift Co., 2998 North Euclid Ave., Bay City, Mich.—Bulletin gives details concern-

ing manufacturer's new ¼-ton capacity, one-man operated, hydraulic lift hand truck. Publication illustrates operating steps of vehicle, describes components, construction and design features and furnishes detailed specifications and suggestions as to application.

For More Details Circle No. 115—Page 239

METALLIZING: Metallizing Engineering Co., 38-14 Thirtieth St., Long Island City 1, N. Y.—Two bulletins discuss metallizing, or metal spraying, with particular emphasis upon the value of the process in maintenance work, but in other applications, too.

For More Details Circle No. 116—Page 239

DEHYDRATORS: Selas Corp. of America, Philadelphia 34 — Bulletin SC-1013 discusses the need for dehydration and the extent to which gas or air can be dried practicably with the operation of specified equipment through the continuous removal of water vapor to dew points as low as −100°F.

For More Details Circle No. 117—Page 239

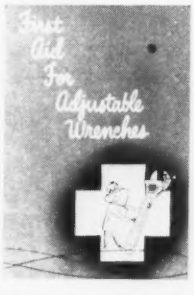
CONVEYORS: Prab Conveyors Inc., 19875 Mack Ave., Detroit 30—Catalog 250 describes the organization's specialized conveying equipment. The contents include drawings, engineering data, photographs of applications of the firm's steel belt conveyor and other material.

For More Details Circle No. 118—Page 239

MAGNESIUM DOCKBOARDS: Magnesium Co. of America, 1515 North Kilpatrick Ave., Chicago 51—Illustrated folder shows how lightweight, heavy duty magnesium dockboards facilitate and make safe loading and unloading on shipping docks.

For More Details Circle No. 119—Page 239

ADJUSTABLE WRENCHES: Utica Drop Forge & Tool Corp., Utica 4, N. Y.—Pamphlet tells how to get long, useful life from adjustable wrenches. Common ailments of long-used adjustable wrenches are dealt with in pictures, diagrams and repair instructions. Proper care and handling of new and undamaged wrenches is also treated.



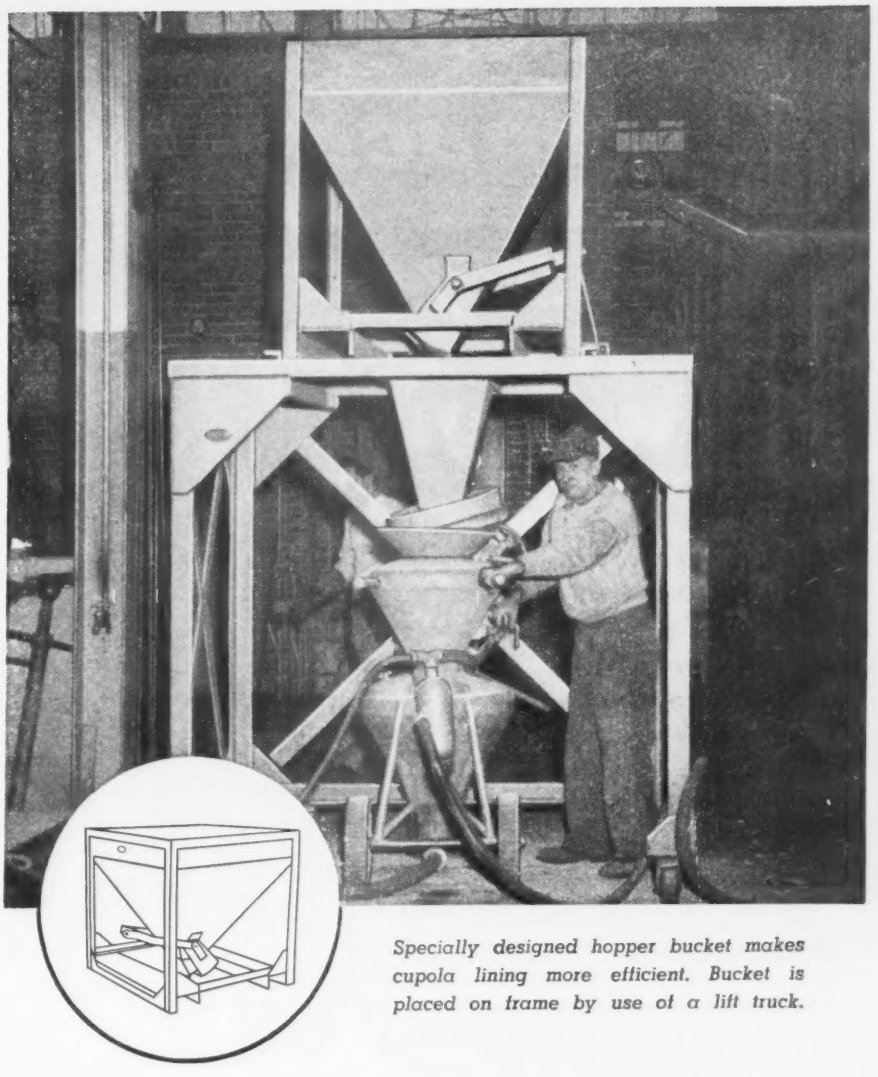
For More Details Circle No. 120—Page 239

SPECIALTY ALLOYS: Philadelphia Bronze & Brass Corp., 22nd and Masters Sts., Philadelphia 21—Booklet lists specialty alloys available for industrial nonferrous castings and forgings. Physical properties and applications are listed.

For More Details Circle No. 121—Page 239

CLEANING WALLS: Ross & Story Products Corp., 705-707 Dewitt St., Syracuse, N. Y.—Folder presents advantages of cleaning walls and ceilings with modern, precision built, nonelectric, portable machine.

For More Details Circle No. 122—Page 239



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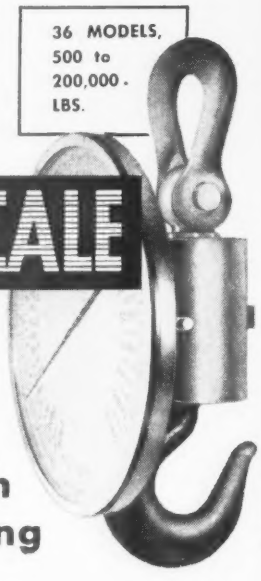

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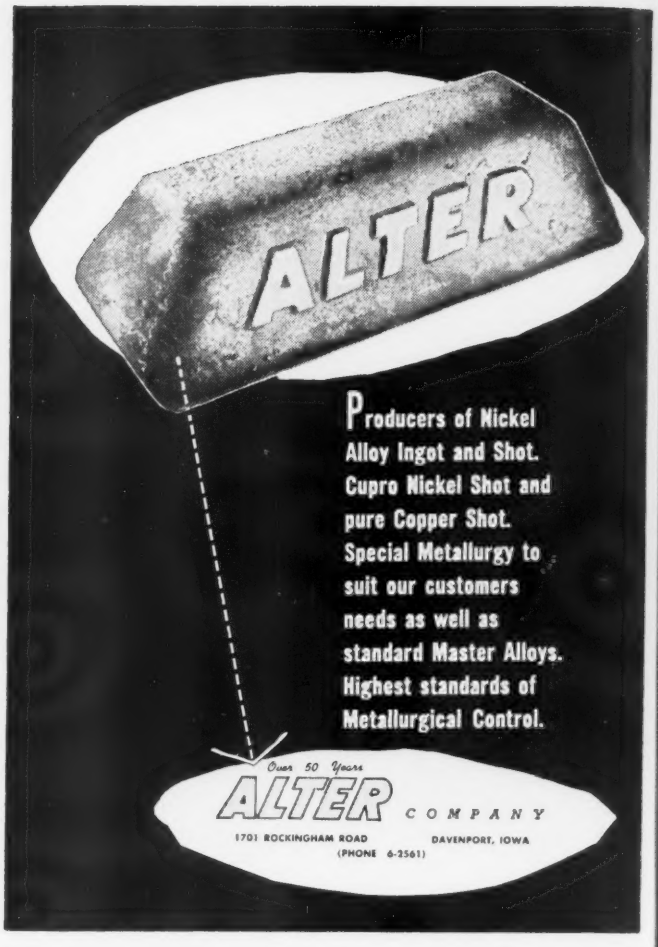
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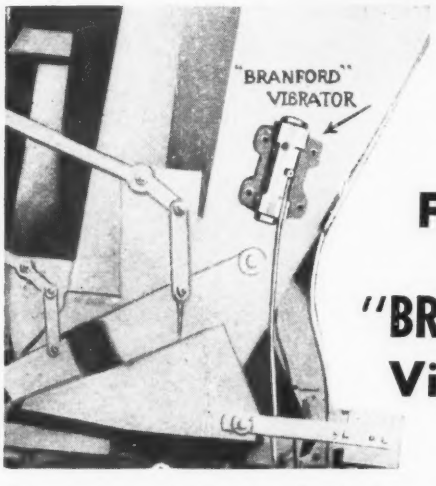

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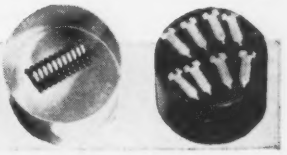

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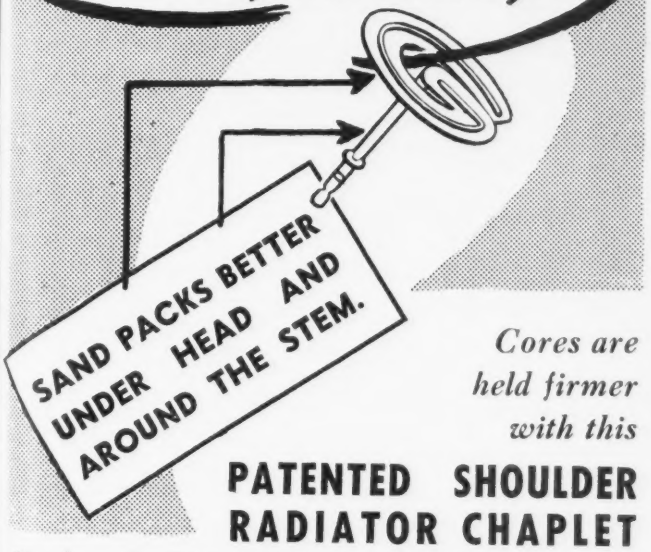

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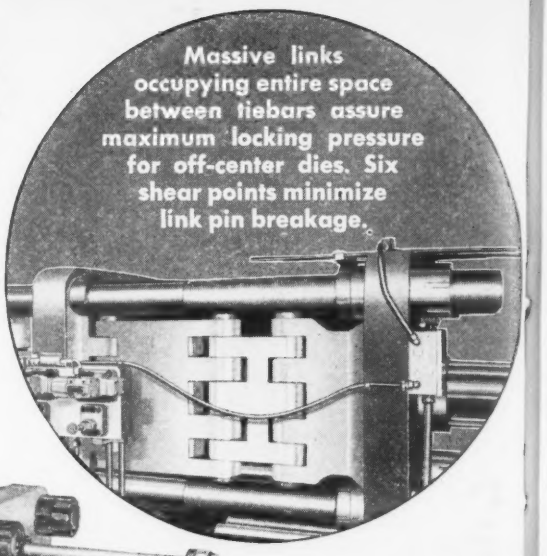
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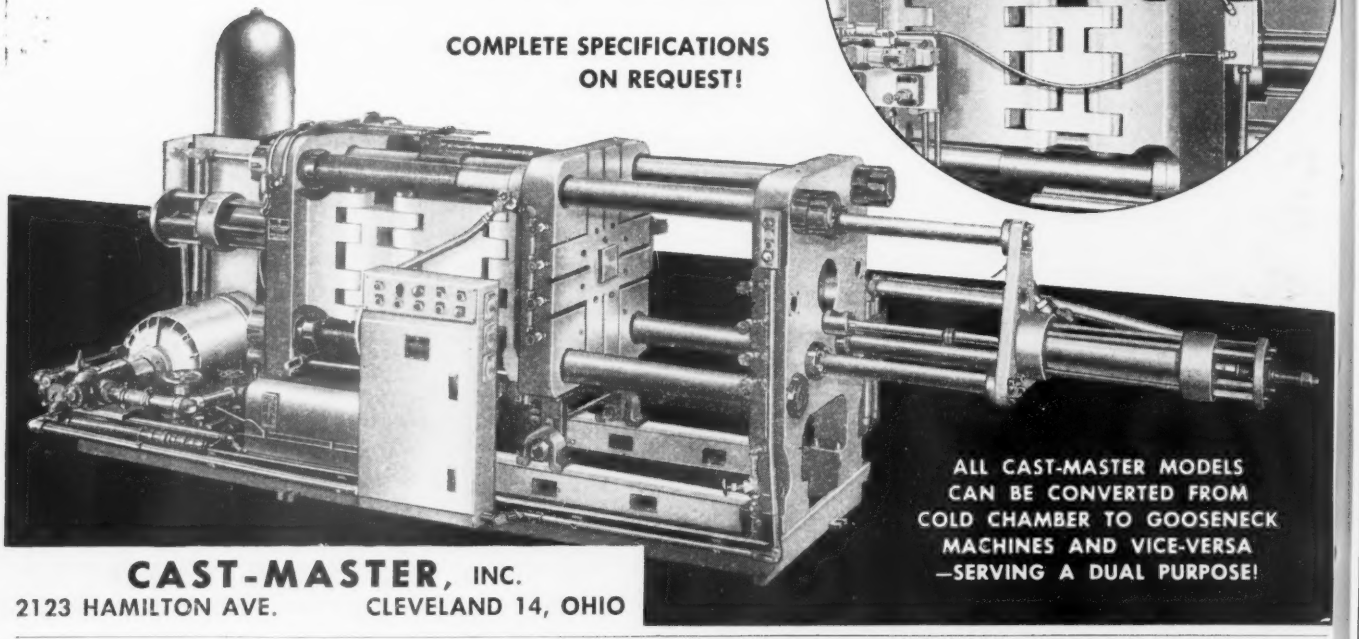

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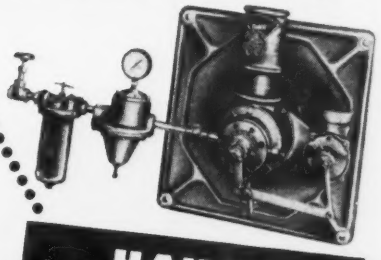
WRITE for FREE DATA BOOK and full details on FRONTIER 40-E Aluminum Alloy.

Remember — if ALUMINUM can do it better — FRONTIER 40-E ALUMINUM ALLOY can do it Best!

FRONTIER BRONZE CORPORATION

4878 Packard Road, Niagara Falls, N. Y.

IT'S 2 BURNERS IN 1



BURNS GAS OR OIL OR BOTH

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SWITCH FUELS INSTANTLY WITHOUT PRODUCTION DELAYS

HAUCK COMBINATION OIL AND GAS PROPORTIONING BURNER

By installing them on your annealing furnaces, melting furnaces and core ovens, you can burn either fuel with equally good combustion and efficiency in a wide range of capacity. Instant switching of fuels without any changing of burner parts or piping. Single lever regulates and automatically proportions the flow of both air and gas or oil. Burners also available with individual control valves for fuel and air. Catalog 408-A.

HAUCK MANUFACTURING CO.

Oil and Gas Burners for Core Ovens, Annealing Furnaces, Heating and Drying

106 TENTH STREET • BROOKLYN 15, N. Y.

PP INC.

What's Your Scrap Loss?

A *few cents* invested in genuine Porcelain Products Ceramic Strainer Cores *can save you dollars in production costs!*

With PP INC. Ceramic Strainer Cores in the gates, you'll turn out *improved* castings free from slag . . . *cleaner* castings that mean *fewer rejects* and *less time* in the cleaning room. In short, *higher quality* castings for your customer . . . *and at no extra cost,* because the additional foundry profits realized from increased production, fewer rejects and lower cleaning costs will more than pay for PP INC. Ceramic Strainer Cores used.

May we send samples and complete information?

Look at these Advantages . . .

- Economical to use . . . pay for themselves.
- Substantially reduce chipping, welding and grinding.
- Dependable . . . won't fracture under molten heat.
- Available in sizes to cover a wide range of requirements.
- Packed for safe, easy handling.

Porcelain Products, Inc.
FINDLAY, OHIO

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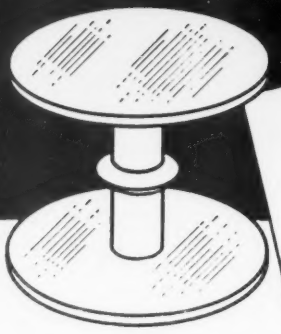
no chance for leakage here



Buffalo CHAPLETS

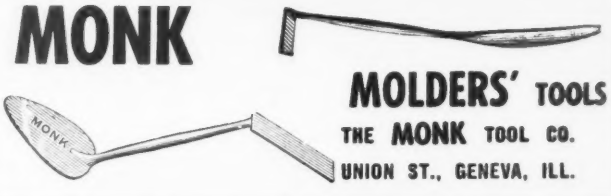
Exclusive fin design of both Double and Single Head types assures positive fusion with molten metal. No recess in stem to weaken structure. Leakage problem is ruled out. Burns in more easily. Does not chill molten metal.

In addition, extensive variety of other types to meet your needs exactly. Since 1912, serving the nation's leading foundries. Trial samples without charge.

Complete information in Catalog No. 16

Manufactured by
Combined SUPPLY & EQUIPMENT CO., INC.
211 CHANDLER ST., BUFFALO 7, N. Y.

MONK MOLDERS' TOOLS



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UNION ST., GENEVA, ILL.

SERVING THE FOUNDRY INDUSTRY SINCE 1907

CRUCIBLES (all types)
RETORTS, GRAPHITE SHAPES
SUPER REFRACTORIES, FLUXES

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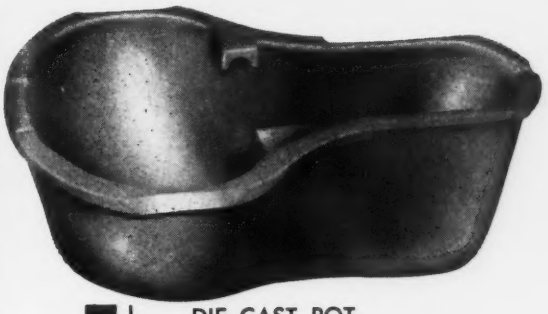
Associate Member Institute of Scrap Iron and Steel, Inc.

A-2757



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THEY STAND THE HEAT!

ACME { MELTING POTS
DIE CAST POTS
INGOT MOLDS

. . . for Melting Nonferrous Metals

Made of Special Formula Cast Iron

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Write for Data Sheet on 40 Sizes

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2502 22nd St.
Detroit 16, Mich.

SPOUT POT
NO. 550A

HOLDING BOWL
NO. HP7001

Compact- Powerful. Versatility

The New 50 oz.
BIG BULLY
AIR HAMMER

On foundry and metal working operations too heavy for the Bantam Bully use the new Big Bully. It offers you compactness plus the powerful results necessary on difficult foundry chipping, heavy weld scaling, chiseling and routing, gouging and grooving, cutting and star drilling and many other tough jobs.

The Big Bully is a precision tool 6" long, delivering 9000 sharp blows per minute from 6.5 C.F.M. of air. Its exclusive trigger metering control provides complete regulation from a feather weight touch to a hard blow.

Write today for full details on the Big Bully, Bantam Bully, Bully Blow Gun and the Bully Fulflo Air Filter.

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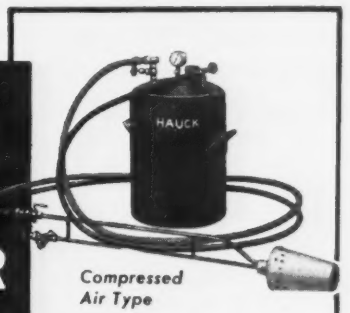
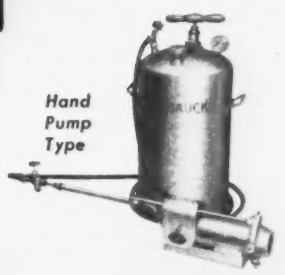
4758 WARNER RD. • CLEVELAND 25, OHIO

SAVE TIME • SAVE LABOR
IN LIGHTING CUPOLAS

with
HAUCK
Portable
OIL BURNER Equipments



Compressed Air Type



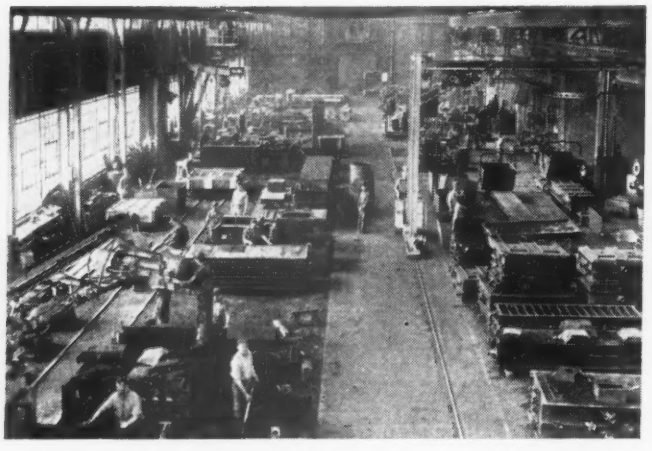
Hand Pump Type

Powerful, clean easily regulatable flame

Popular in foundries everywhere because they are rugged, efficient, easy to operate and maintain. No smoke or noxious gases. Can also be used for ladle heating and mold drying. Write for Catalog 1043.

HAUCK MANUFACTURING CO.
Oil and Gas Burners for Core Ovens, Annealing Furnaces, Heating and Drying
106 TENTH STREET • BROOKLYN 15, N. Y.

MAKE YOUR FOUNDRY DUST-FREE with COMPOUND M



Many foundries in the country no longer look like foundries! From their clean floors and walks, you would almost think you were in a spotless machine shop!

The Johnson-March system with Compound M stops dust at its source—and it is the one system that provides positive control of dust at a cost averaging less than 1/10th of other systems.

Don't let dusty floors and walks affect your workers' efficiency . . . create work stoppages . . . be a constant health hazard. Investigate this low-cost system today. Our engineers will be glad to discuss your problems at no obligation.

Johnson March

Specialists in Dust Control

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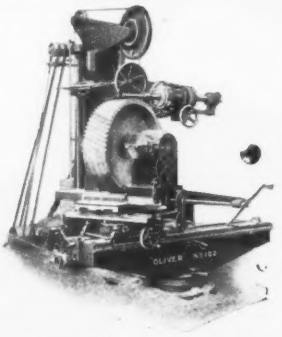
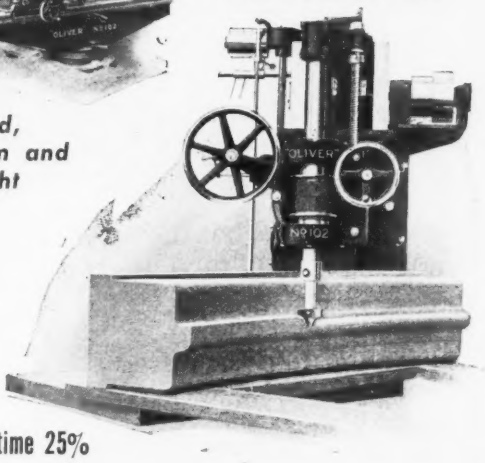
"OLIVER" PATTERN MILLING MACHINES



Cut wood, aluminum and other light metals



Cut production time 25%

The No. 102 cuts patterns for spiral, spur, bevel, worm gears at savings of 25% in time. And finishes core boxes at savings up to 75% in time. Does accurate, smooth work. Unlimited capacity. Used by leading engineering firms throughout the world. Write for details.

OLIVER MACHINERY COMPANY

Established 1890 **GRAND RAPIDS 2, MICHIGAN**

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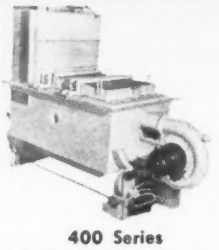
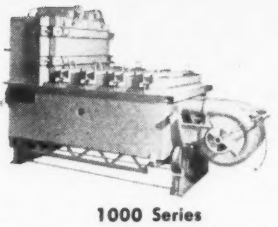


400 Series



1000 Series

Reda Stack-Loading melting furnaces for ferrous and non-ferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer, uninterrupted melting runs, and lower melting costs.

Another feature is the Reda Burner arrangement which can operate from oil and gas simultaneously or be switched from one fuel to the other instantly.

Write or phone for complete details.

	CHARGE		MELT CAP./HR.	
SERIES	IRON	BRONZE	IRON	BRONZE
400	400#	450#	800#	1350#
550	550#	625#	1100#	1875#
1000	1000#	1125#	2000#	3375#
2000	2000#	2250#	4000#	6750#

LARGER MODELS ON REQUEST

STACK LOADING

DIRECT FIRED—REFLECTING TYPE

REDA FURNACE

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For low cost cleaning

- AMASTEEL is the blast cleaning material that is engineered for the job.
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- AMASTEEL lasts many times longer. Investigate!
- AMASTEEL provides peak efficiency in shot for blast cleaning and peening. Developed by the maker of "PEENBLAST", "CLEANBLAST" and "ALLOY 99".

Abrasive for any and all kinds of work.

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DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS
because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

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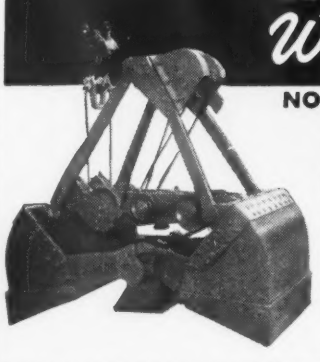


NO BUCKET-OPENING SHOCK ON CRANE HOOKS

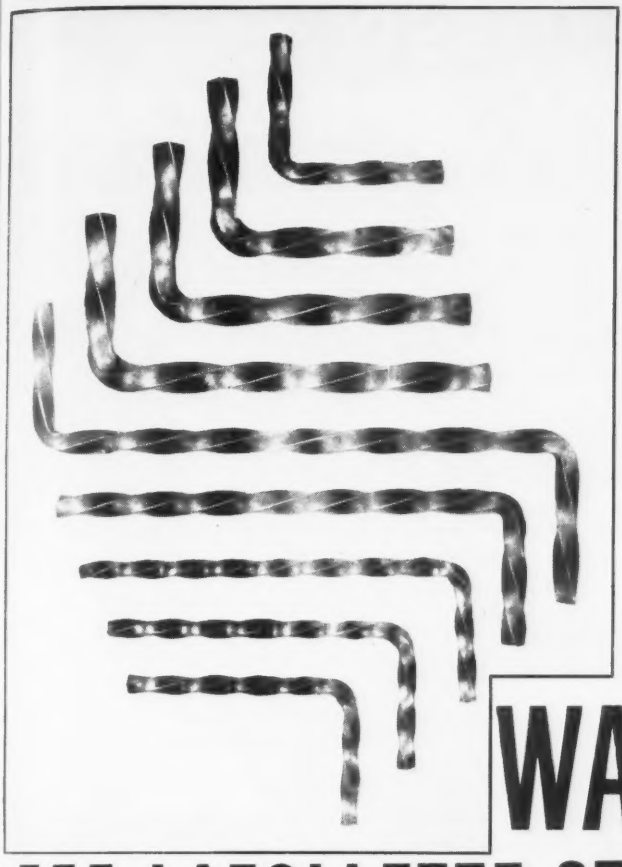
The Wellman "Hook-on", single-line bucket provides you with clamshell bucket service at any crane hook where suitable head room and hoist capacity are available.

Both bucket and crane are protected against opening shock by a pair of adjustable snubbing sheaves. The snubbing action on the closing lines eliminates any shock when the bucket opens—an important feature since the operator cannot control opening speed of a single-line bucket.

Capacities from ⅜ to 2 cubic yards. Write for free bulletin.

THE WELLMAN ENGINEERING CO. 7019 CENTRAL AVE. CLEVELAND 4, OHIO

WADSWORTH TWISTED STEEL GAGGERS



WADSWORTH square twisted soft steel GAGGERS can be furnished in 3/8", 1/2" and 5/8" thickness.

Heel, leg and toe are made to customers' specifications, single or double bend. Square twisted gaggers are dependable sand reinforcements which will stand rough and repetitious usage, and have superior sandgripping power

We can also furnish reinforcing bar, or round deformed bar type gaggers. Available through your Foundry Supply House, or simply contact:

WADSWORTH EQUIPMENT

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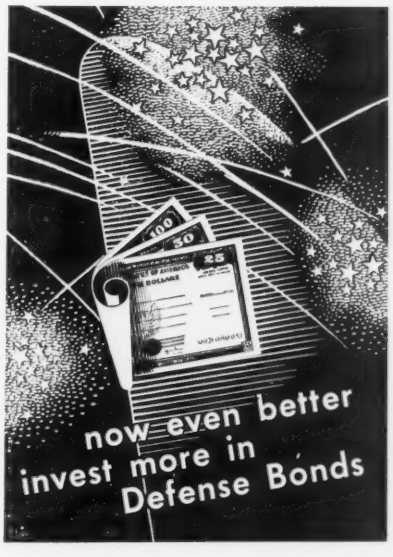


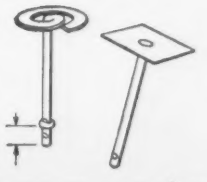
CHAPLETS

MOTOR CHAPLETS

Although used primarily in motor cylinder castings, this type of chaplet is one of the best for pressure castings. They fuse well and do not cause leaks.

RADIATOR CHAPLETS

See page 9 of our Catalog 148-F for complete information on types, sizes and uses of radiator chaplets. May we send you a copy?



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MANUFACTURING COMPANY
MANUFACTURERS OF HINGE TUBES, CHAPLETS AND FOUNDRY SPECIALTIES
GENEVA • ILLINOIS

. . . Just pull the trigger WITH THE MURPHY PISTOL SPRAYER

and the HAMILTON SPRAY GUN

$10.00 F.O.B. Hamilton, Ohio

Complete with a 4½ ft. length of suction hose and sinker. For spraying molds and cores with liquids, for cleaning motors and machinery, for laying dust, for spraying hot roofing materials, and many other uses. Trigger control, guaranteed.

Just pulling the trigger of the MURPHY PISTOL-SPRAYER shoots a stream of blackening into inner pockets that could never be reached by the old-fashioned brush or swab method. This sprayer was designed by a practical foundryman and now it is widely used for cleaning permanent molds, for aluminum and other metals, and also for sand-blasting.

PRICES COMPLETE WITH SUCTION HOSE AND SINKER

PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

Also a complete line of products designed to banish moisture from all kinds of air compression systems — Aftercooler, Separators, Filters, Traps, and Regulators.

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Over a million sold to date

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
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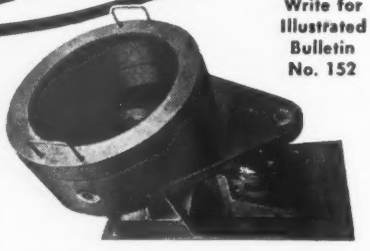
Moisture Elimination Up To 3000 Pounds Per Square Inch

Ideal for EXPERIMENTAL CENTRIFUGAL CASTING

Write for Illustrated Bulletin No. 152



MODEL J is well suited for experimental work in Aluminum, Iron, Steel and Bronze as well as regular production. Casts bearings, bushings, gears, etc. Accommodates interchangeably both permanent molds or sand molds up to 24" in diameter and up to 12" high.

MODEL J is versatile, sturdy and easy to operate to produce economically a wide range of superior castings. It is completely integrated on a single base, readily moved as a unit, and does not require a special foundation.

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GRAY IRON FOUNDRIES Simplify Chill Control . . .

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TELLURIUM

Available in 1, 2, 3, and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 16-page article on the use of TELLURIUM in chill control

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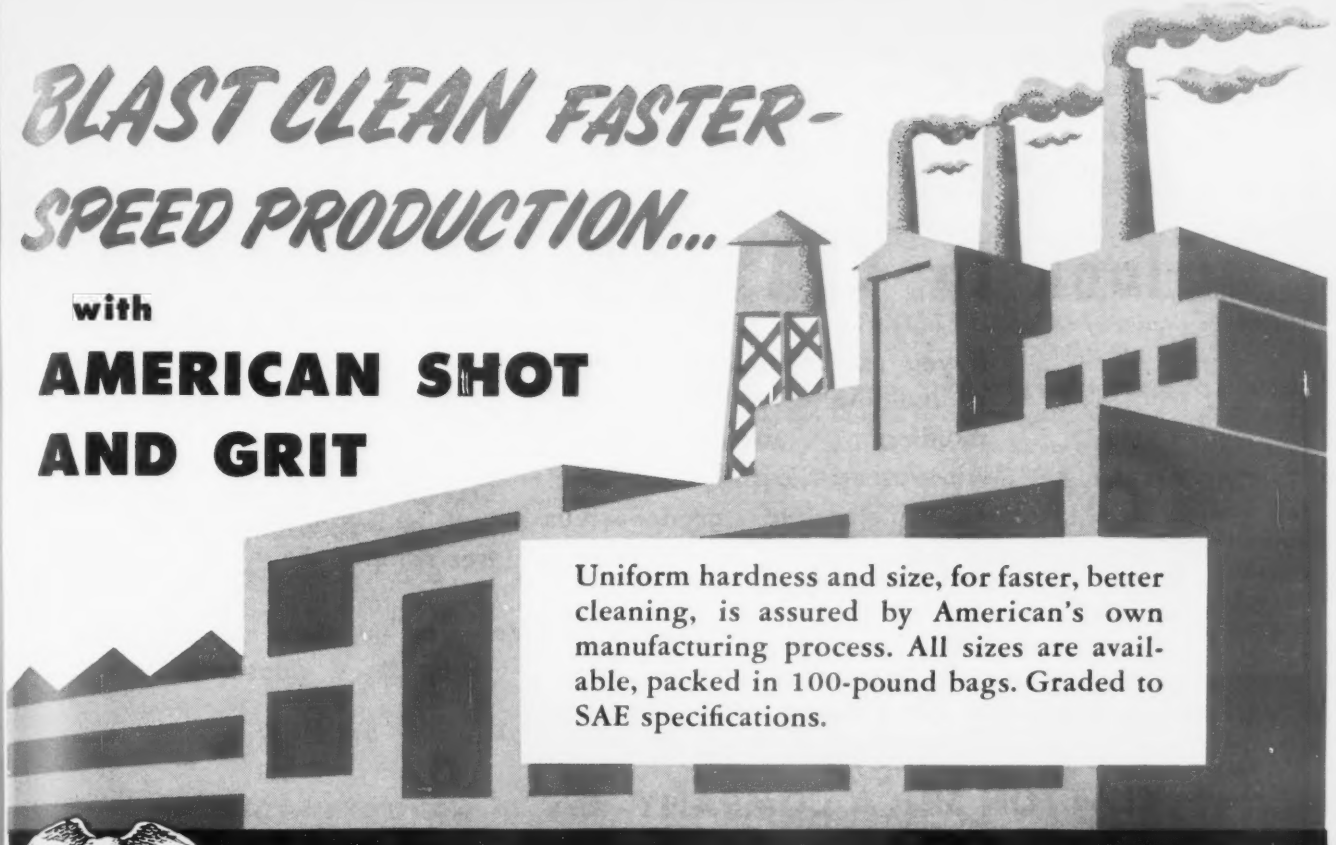
BLAST CLEAN FASTER- SPEED PRODUCTION...

with

AMERICAN SHOT AND GRIT

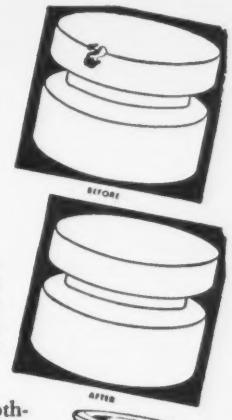


Uniform hardness and size, for faster, better cleaning, is assured by American's own manufacturing process. All sizes are available, packed in 100-pound bags. Graded to SAE specifications.

The AMERICAN STEEL ABRASIVES CO. GALION, OHIO

MEMBER FEMA

For Surface Blemishes in ALUMINUM CASTINGS



Have you used the Smooth-On Foundry Cement made especially to correct blow holes, porous and rough spots, dents and other unsightly but harmless surface defects in otherwise sound *aluminum alloy castings?*

Applied like the widely used Smooth-On *Iron* Foundry Cement, Smooth-On No. 8 *Aluminum* Cement fills in evenly, hardens quickly, matches perfectly. Stays in place, too, for it expands slightly as it sets.

Smooth-On No. 8 Aluminum Cement comes in 1- and 5-lb. sizes. 1 lb. will fill 17 cu. in. Order it by NAME AND NUMBER from your supply house. If they haven't it, write us. If you have not yet discovered Smooth-On No. 8, ask us for

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You'll receive also the famous 40-page SMOOTH-ON HANDBOOK, filled with industrial uses for the various Smooth-On Cements. 170 illustrations. Write today.

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No. 8 ALUMINUM CEMENT

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DUST COLLECTORS
Recirculating Water Type —Compact—Efficient—Proven by Foundry Users

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More Air Circulation— Faster Bake and Better Cores

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With our great production capacity plus our unlimited raw material supply, you can be sure of prompt service any time of the year. Available in bulk or bag . . . Write us for free sample.

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TRY OUR SHELL MOLDING SAND

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ARIDIFIER

Scrubbed CLEAN AND DRY

INSTALL ARIDIFIERS ON LINES SERVING

- Paint Spray Guns
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- Foundry Jogging Machines
- Sand Blasting Tools
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On any air or gas line 92% of the dirt, oil, scale and water that enter the Aridifier is trapped and removed from circulation. The Aridifier's patented centrifugal-baffle action scrubs air and gas clean and dry . . . protects equipment, prevents freezing, fouling, corrosion and caking, produces best results with spray gun and air tool operations, etc. Easy to install. Self cleaning. Maintains itself. 10 models available. Capacity 7 CFM to 17,000 CFM.

Learn HOW the Aridifier scrubs with a patented centrifugal-baffle action.

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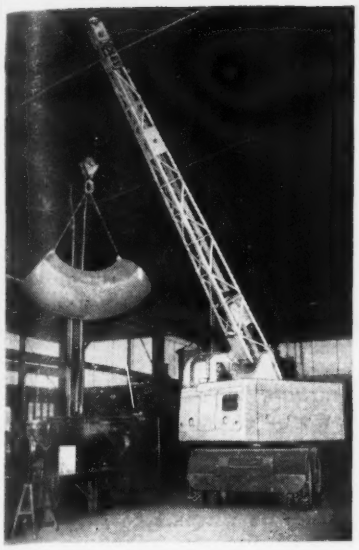


..."is IDEALLY SUITED...has meant REAL SAVINGS in handling costs to our company"

says Large Manufacturer of Pipe

and . . . "We are extremely pleased with its VERSATILITY—ACCURACY and SPEED in handling various types of work we have needed done." YES! Whether the material to be handled is inside your plant or outside yard, with only one gallon of gas an hour, COLES CRANES one-man operation and manoeuverability are unsurpassed.

VERSATILITY—inside and outside

A nationally renowned corporation reports:—that after two years of operating a COLES CRANE, only $15.00 was spent on service parts.

So with LOW MAINTENANCE and LOW OPERATING costs, add to this COLES exclusive safety features such as SAFE-LOAD Indicator, reversible steering, and no clutches to get out of order it is no wonder why COLES has over 10,000 cranes in operation all over the world. Why not investigate. Write for full particulars.

COLES CRANES, Inc.
Box 942 -X
Joliet, Illinois

COLES CRANES INCORPORATED

THE NAME THAT CARRIES WEIGHT IN MATERIAL HANDLING!

HARDLAC *Protects* WOOD or METAL PATTERNS

*** In Use Or In Storage**

Hardlac pattern coating in standard pattern colors recommended by A.F.A. is ready to use and easy to apply. It sets up a smooth surface that resists core-oil absorption and sand abrasion. Protects patterns from swelling, shrinking and cracking. Ideal for metal patterns, also. *Write for Literature.*

McDOUGALL-BUTLER CO., INC.
General Offices, Buffalo 14, New York

FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

ENGINEERS

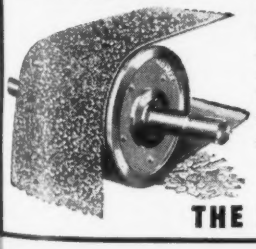
FOR SAND SLINGERS, CONDITIONERS AND CONVEYORS . .

HERE IS THE ANSWER TO YOUR MAGNETIC SEPARATOR JOBS!

HOMER *"Power-Plus"* Magnetic Separators

Permanent non-electric—Unaffected by Heat, Cold, Moisture

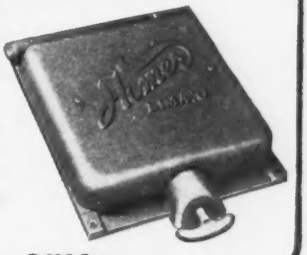
. . . CAN BE USED INSIDE or OUTSIDE PLANT . . .



Homer MAGNETIC PULLEYS and UNITS —Available in standard diameters from 12" to 30"; belt widths 4" to 60". Special sizes upon order.

Homer MAGNETIC DRUMS—Available in standard diameters from 12" to 30"; face widths 4" to 60". Can be furnished with or without enclosure.

Homer MAGNETIC PLATES—Available in standard widths from 4" to 26"; lengths and number of poles as required. Special fabrications to your specifications.



Write for descriptive bulletins

THE HOMER MANUFACTURING CO., INC., DEPT. 156, LIMA, OHIO

Heroult

ELECTRIC MELTING FURNACE

. . . as ever, the dependable furnace for the production of high-grade stainless, alloy and rimming steels.

Removable roof of new design now available for the larger furnaces.

AMERICAN BRIDGE DIVISION
UNITED STATES STEEL CORPORATION
General Offices: 525 William Penn Place, Pittsburgh, Pa.

Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities

USS **AMERICAN BRIDGE**
UNITED STATES STEEL

MAGNESIUM PLATE

HOT ROLLED

Now available from the B & P Livonia Rolling Mill

PROMPT DELIVERY ON 3/16" AND THICKER

Prices Are Competitive on a Square Foot Basis With Aluminum

MAGNESIUM is the lightest weight commercial metal. MAGNESIUM PLATE is one third lighter than aluminum plate. It is strong. It is easily welded by the use of standard commercial practices. Phone, wire or write:

BROOKS and PERKINS, *Incorporated*

1946 West Fort, Detroit 16, Michigan

CLASSIFIED ADVERTISING

Help Wanted

ASSISTANT WORKS MANAGER
FOR
MEDIUM-SIZED MALLEABLE FOUNDRY

Excellent position for experienced malleable supervisor with molding and metallurgical experience. Must be able to handle men and develop supervisors. All replies confidential.

BOX 458

FOUNDRY **CLEVELAND 13, OHIO**

METALLOGRAPHER OR
JUNIOR METALLURGIST

In manufacturing plant metallurgical department, experienced in metallographic studies of ferrous and nonferrous metals and alloys. Foundry experience desired. Prefer college graduate. Include snapshot in first letter. Age 21 to 35. Salary open. State qualifications, references, and salary expected in the first letter. Address: Box 463, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Territory open in Western New York state for aggressive man to sell well-known line of core oils manufactured by 40 year old concern. No objection to handling other lines. Liberal commission. Address: Box 411, FOUNDRY, Cleveland 13, Ohio.

SALESMEN WANTED

By long established refractories manufacturer. Applicant should have experience in industrial selling, preferably to metal melting industries. Prefer applicant between 27 and 35 years, willing to travel. Locations: Midwest and East. Address: BOX 459, FOUNDRY, Cleveland 13, Ohio.

SALESMEN

Excellent future offered in selling shell molding resins in two midwest territories for men with right qualifications—experienced in self management and foundry sales, a leaning toward technical problems and some knowledge of gating, core and molding practice. Compensation includes car, salary, expenses and incentive. Write giving full details. Address: BOX 448, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Malleable iron, New England. Must be able to organize and operate lab. Two analyses per day. Assistant later if required. Right man will ultimately be in charge of quality of product from melting through annealing. Small foundry. Address: Box 454, FOUNDRY, Cleveland 13, Ohio.

FIELD SERVICE MEN

Excellent opportunity for men to demonstrate correct use of synthetic resin core binders in midwest. Car, salary, bonus and expense account. Provide full details and references. Address: Box 451, FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER, FOUNDRY

UNUSUAL OPPORTUNITY FOR AGGRESSIVE MECHANICAL AND FOUNDRY SALES ENGINEER IN SOUTHERN STATES. GROW WITH THE NATION'S FASTEST GROWING INDUSTRIAL AREA. SEND COMPLETE QUALIFICATION RECORD TO: **PERSONNEL DIRECTOR, SAVANNAH MACHINE & FOUNDRY CO., P.O. BOX 590, SAVANNAH, GEORGIA.**

METALLURGIST

For job shop producing gray iron, aluminum, and brass castings. State age, education, experience and salary required. Address: **BLACK-HAWK FOUNDRY AND MACHINE CO., DAVENPORT, IOWA.**

FOREMAN

Experienced on mechanized operation to supervise new rollover and strip mechanized line in established Eastern foundry. State age, experience and salary requirements. Address: Box 450, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY SUPERINTENDENT

To take charge of all phases of gray iron foundry operation. Well established firm located North of Milwaukee. New modern building, modern equipment. Castings up to one ton. Machine, floor and bench work. Address: Box 453, FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

For modern production shop. Must be acquainted with squeezer matchplate work. Good fishing and hunting in this section of Michigan. State experience and references in first letter. Address: Box 445, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOUNDRY SUPERINTENDENT

Jobbing Foundry—nonferrous metals and high alloy steel. Exceptional opportunity for qualified man. Must be a leader and familiar with latest foundry technique and practices. Location Wisconsin, 400 employees.

BOX 449

FOUNDRY **CLEVELAND 13, OHIO**

PATTERNMAKER

Combination wood and metal, prefer man with experience in small brass valve work. Steady, year around position with long established brass shop. In reply give age, complete work record and pay expected. Address: Box 439, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

For high production light grey iron foundry. Employ 100 people. Located in Indiana. Technical knowledge of foundry operation required. Will have complete charge of management. Contacts resulting in new business for foundry would be valuable. Submit complete business history and present employment and recent photograph. Address: Box 446, FOUNDRY, Cleveland 13, Ohio.

WANTED

Aluminum Billet Production Manager
Large Midwestern Firm
Permanent Position
State training, experience and
reference in first letter.

BOX 441

FOUNDRY **CLEVELAND 13, OHIO**

SUPERINTENDENT

Opportunity for well qualified, experienced superintendent of nonferrous foundry employing from 100 to 150 people. Applicant should be between 35 and 45 years of age. Enclose photograph and state complete record of education and experience in detail including previous employment and length of service. Address: Box 436, FOUNDRY, Cleveland 13, Ohio.

PRESSURE CASTING

Need experienced men. Have opening for man qualified to take complete charge of shop. Also men experienced in molding, match making and metal pouring to be future lead men. Address: Box 425, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Territory open in Western Pennsylvania for aggressive man to sell well-known line of core oils manufactured by 40 year old concern. No objection to handling other lines. Liberal commission. Address: Box 412, FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

List past experience and also state salary expected in first letter. Must be familiar with foundry work. Address: Box 372, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY ENGINEERS AND DRAFTSMEN

Having foundry operating or plant engineering experience. Write, enclosing photograph and complete record of education and experience in detail, including previous employers and length of service. State age and salary expected. ADDRESS: LESTER B. KNIGHT & ASSOCIATES, INC., 600 W. JACKSON BLVD., CHICAGO 6, ILL. and 50 CHURCH STREET, NEW YORK 7, NEW YORK.

QUALITY CONTROL MAN

We will train a man that has the following qualifications: Sand control experience; experience in analyzing defective castings; molding experience, knowledge of metallurgy desirable but not essential. Under 40 years of age. Write stating experince and background. Address: Box 466, FOUNDRY, Cleveland 13, Ohio.

CHIEF ENGINEER
FOR FOUNDRY PRODUCING
LARGE MACHINE TOOL CASTINGS

Well known company in Southern Michigan has excellent position for man experienced in metallurgy, foundry operation, and the production of large castings (alloy dies and machine tool). Prefer man presently employed either with similar foundry or in foundry consulting work.

Please send complete resume of background and experience including salary desired. Interviews will be arranged promptly for qualified applicants. All replies confidential.

BOX 482

FOUNDRY **CLEVELAND 13, OHIO**

CHEMIST

For development of phenolic industrial resins and foundry specialties. Three to five years' experience required and ability to initiate program in new laboratory. Location East. In confidential reply state education, experience and salary expected. Address Box 478, FOUNDRY, Cleveland 13, Ohio.

METALLURGISTS

Two recently graduated metallurgists. One to handle cupola operation problems and assist melting foreman. One to work on new methods of operation and metallurgical problems in modern progresssive malleable iron foundry in Northeastern Ohio. State experience, references, salary.

BOX 473

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY MELTER

Foundry melter, duplex malleable melting, large foundry in Midwest. Must be willing to learn and study melting practices. Write, state education, training, experience (not necessary) in letter. Address: Box 474, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY ENGINEER

Experienced in all phases ferrous and nonferrous. Desire position in management, supervision or engineering. Can direct all phases of foundry activity, foundry processing all departments, also estimating, pattern equipment and castings from prints. Sand, permold, and shellmolding. Production processing of above. Sixteen years' experience, nine in management. Age 33, will relocate, steady. Address: Box 455, FOUNDRY, Cleveland 13, Ohio.

SALES TERRITORY WANTED

In Michigan, Indiana or Ohio with a foundry company or a company serving the foundry industry. Mechanical and metallurgical engineering graduate. Experienced as melting superintendent, foundry superintendent, customer contact and manager. Good appearance. Pleasing personality. Address: Box 462, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Twenty-five years' experience in light production and light to heavy jobbing gray iron foundries. Practical experience in every department. Cost minded and aggressive. Address: Box 469, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT

Wants charge of gray and semi-steel foundry running 10 to 40 tons per day. Twenty-eight years experience, twelve in supervision. Good sand control both green and dry. Very little trouble, with cupolas. Practical experience on rollover, squeezer, and sand slinger, machines. Floor and bench molding. Will consider trouble shooting or cupola supervision. Address: Box 465, FOUNDRY, Cleveland 13, Ohio.

FOREMAN—WOOD PATTERNMAKING OR PURCHASING PATTERNS AND CASTINGS

Twenty-two years as foreman and department manager in wood patternmaking including also ten years purchasing patterns and castings, expediting and coordinating. Experience on patterns for the machine tool industry, power presses, rolling mill equipment, etc. Best of references from wherever pattern equipment was used. Address: Box 209, FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Recent graduate, married, veteran, desires assistant metallurgical position in progressive foundry, preferably steel in Midwest. FEF student, majored in foundry and ferrous metallurgy. Excellent scholastic record and varied experience. Address: Box 480, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 437, FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry machine and related lines. Address: Box 222 FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Graduate, 15 years' practical experience in gray iron and steel foundries as assistant foundry manager. Five years as foundry equipment and mechanization project engineer. Presently employed desire change. Address: Box 464, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desires position as superintendent or general foreman. Practical man. Twenty-seven years' experience in gray iron, ductile iron and nonferrous, jobbing and high production shops, soil pipe and farm implement. Address: Box 447, FOUNDRY, Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Twenty-eight years of gray iron experience and some nonferrous Outstanding practical and technical background. Have supervised as many as three hundred men, 125 tons daily, production and jobbing, mechanized or semi. Excellent cost man, ability to handle men and can obtain results. Age 47. Address: Box 443, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Twenty-eight years foundry experience. Production minded, capable in steel, iron or malleable foundries. Supervise on machines, core blowers or rollover. Address: Box 444, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM SUPERINTENDENT

Age 44. Experienced in all phases of coremaking, including sand mixing, drying and assembling. Can handle large groups of workers, male and female. Trouble shooter on cored castings. Very good on production. Will relocate. Address: Box 461, FOUNDRY, Cleveland 13, Ohio.

ARE YOU LOOKING FOR A SHELL MOLDING ENGINEER?

Engineer with background tool engineering, die casting, plastic molding, investment casting, would like to set up shell molding operation. Designed shell molding dies, machinery and equipment. Currently employed as chief engineer with large midwestern foundry. Must give notice. Salary secondary to opportunity. Address: Box 440, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Young, progressive foundryman; 15 years' experience in Navy and marine jobbing work, all phases and metals. Desire opportunity to operate or assist operation of small or medium-sized jobbing foundry. Willing to locate wherever opportunity exists. Consider partnership. Age 35, married. Available on short notice. Address: Box 476, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY MANAGER

Twenty-six years in machine tool foundries. Experience covers all foundry operations. Specialized knowledge of foundry cost control, incentive systems, industrial relations, production methods and organization. Foundry consultant on sand and quality control, mechanization, cupola operation and general foundry problems. Age 42, now employed. Address: Box 427, FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE

Experienced in all phases of foundry operations. Steel, iron nonferrous, plant and industrial engineering, cost control, accounting, industrial relations, machining administration. Address: Box 408, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Successful background as superintendent in shops up to 300 men. Excellent record on quality control, organizing ability, production and costs. Technical and consultant experience on sand properties, cupola operation and mechanization. Gray iron, large or small, jobbing or production. Age 43. Address: Box 235, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desire position as general foreman or superintendent. Wide experience in all phases of foundry operation. Prefer small aluminum or magnesium foundry, where directing ability, rigging for production, and scrap reduction is needed. Perfect health, 54 years old. Free to move if necessary. Address: Box 460, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Available, capable, experienced, all around foundryman. Light medium and heavy castings, captive and job shop experience. Can plan and organize work; handle labor relations, customer contact. Familiar with latest methods. Address: Box 438, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

MANAGER-SUPERINTENDENT

Experienced in all phases of foundry operations. Gray iron, some nonferrous, cost minded, scrap control, sales, industrial relations, production methods. Midwest preferred. Address: Box 457, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER AND METALLURGIST

Married, 30, degree in Metallurgical Engineering, ten years' foundry experience including four years' supervisory experience, desire management position in small or medium size ferrous or nonferrous foundry. Address: Box 470, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN

Large or small castings in grey iron or nonferrous, green or dry sand. Twenty years' practical experience in all foundry details. New Jersey preferred. Address: Box 472, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Age 43. Have 25 years' practical experience ferrous and nonferrous. Fully qualified to take complete charge all foundry operations, Molder and coremaker, jobbing or production. Prefer aluminum or malleable. Employed. Address: Box 477, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Graduate M.E., MIT 1948. Experience: brass and bronze, some gray iron; cores and shell-molding. Desire position in New England, research and development or production, managerial. Age 28, married. Address: Box 468, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN EXECUTIVE

Gray iron. Well versed in all phases of foundry operation. Experienced executive, consultant on cupola operation, metallurgy and production procedures. Desire position with company in need of such experience. References. Address: Box 475, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

First class, young, engineering background. Effective training personnel. Successfully designed pattern equipment and castings for improved molding and machining. Prefer the Eastern states. Address: Box 471, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR FOREMAN

For jobbing gray iron foundry. Eleven years supervisory capacity. Age 42, married. Good references. Address: Box 456, FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Positions Wanted

MANAGER OR EXECUTIVE ASSISTANT

Nineteen years' experience in iron and steel foundries in operations and management. Graduate engineer. Address: Box 481, FOUNDRY Cleveland 13, Ohio.

Wanted-To-Buy

WANTED TO BUY

Wanted plumbing brass manufacturing company with foundry, machine shop, and plating plant, to manufacture complete line of plumbers brass goods. State full details.

BOX 452

FOUNDRY CLEVELAND 13, OHIO

WANTED

Machinery for production—Simpson Mixers, Raymond Pulverizer, vibrating screens, Riehle Testing Machines. Address: **P.O. BOX 1351, CHURCH STREET STATION, NEW YORK 8, NEW YORK.**

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

FURNACES WANTED

1—50# and 1—200# INDUCTION FURNACES wanted, with 50 K.W. GENERATOR SET for operations at 2900° F., with electrical equipment.

CONSOLIDATED PRODUCTS CO., INC.

13-20 PARK ROW NEW YORK 38, N. Y.

TELEPHONE: BARCLAY 7-0600

WANTED

Hines pop-off Aluminum flasks and pouring jackets. All sizes. Must be in excellent condition. Address: **MARCH-BROWNBACK CO., INC., POTTSTOWN, PA.**

AIR RECEIVER TANK WANTED

300 or 400 cubic feet capacity. Must be to ASME Specifications and bear such label.

Advise dimensions, price and location.

THE FEDERAL FOUNDRY SUPPLY COMPANY 4600 EAST 71ST ST. CLEVELAND 5, OHIO

SAND TEST EQUIPMENT WANTED IN GOOD CONDITION

Rammer and specimen tube, permeability meter, hand operated strength machine, over, sand washer and bottle, testing sieves (12) and sifter, possibly other. Address: Box 748 Springfield, Ohio.

WANTED TO BUY

Dust collector, 10,000 CFM capacity. Address **SHEAHAN CO., INC. 4711 W. ELECTRIC AVENUE, MILWAUKEE 14, WISCONSIN.**

WANTED TO BUY

Used—straight jolt machine—must be in good condition and have a capacity 24,000 to 27,000 lbs. with a cylinder 18" to 20" diameter bore.

BOX 483

FOUNDRY CLEVELAND 13, OHIO

WANTED
MOLDING MACHINES

3—Osborn #276-J Molding Machines
1—Osborn #443 Molding Machines
1—Osborn #712 Molding Machines
2—Osborn #714 Molding Machines

MUST BE IN EXCELLENT CONDITION
MARCH BROWNBACK CO., INC.
POTTSTOWN, PA.

Employment Service

EMPLOYMENT COUNSEL, INC.

"All The Name Implies"

JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS	SUPERINTENDENTS
GENERAL FOREMEN	MOLD FOREMEN
CORE FOREMEN	MELTING FOREMEN
CLEANING FOREMEN	MAINTENANCE FOREMEN
PATTERN FOREMEN	METALLURGISTS
INDUSTRIAL ENGRS.	TIME STUDY ENGRS.

And all other Administrative and Sales Positions.

WRITE or CALL for registration.

Completely Confidential

SUITE 500
CHICAGO 2, ILLINOIS

7 WEST MADISON ST.,
FINANCIAL 6-2100

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Foundries For Sale

FOUNDRIES FOR SALE

IRON FOUNDRY producing 15 tons of high quality castings per day. Latest type equipment for high production runs.

IRON FOUNDRY completely mechanized plant producing 100 tons per day.

IRON FOUNDRY producing 7 tons small and medium jobbing castings per day. Price $40,000, easy terms.

EDWIN H. ZOLL

FOUNDRIES SOLD AND LEASED

720 BROAD STREET

NEWARK 2, NEW JERSEY

FOR SALE
GRAY IRON FOUNDRY

53,000 square feet, 50 ton capacity. Fully equipped and in operation 60 miles from Cleveland on Erie R. R.

FOR COMPLETE DETAILS

THE KUNKLE FACTORY SITE SERVICE

1909 TERMINAL TOWER, CLEVELAND, OHIO

CHerry 1-2680

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOR SALE OR RENT

Modern productive aluminum foundry and pattern shop with plenty of good paying customers. Capacity for five molders and three patternmakers. Plant in operation now. Address: **JAMES C. SCHRADER, 5269 WEST GRAND AVENUE, CHICAGO 39, ILLINOIS.**

FOR SALE

Well equipped grey iron foundry and machine shop in the center of North Dakota's oil boom. One of the greatest opportunities in the Northwest. Under the same management for fifteen years. Reason for selling—ill health. Call or write: **MINOT FOUNDRY CO., MINOT, NORTH DAKOTA.**

FOR SALE

Gray iron foundry located Southern Massachusetts well-equipped in every respect for production work. Excellent clientele with good volume of business on hand. Low price. Excellent venture for working partners. Address: Box 479, FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR SALE

Brick and steel foundry, Southern Illinois, 160 x 320 feet, overhead monorail water transportation available. Ideal for mechanized operation, contains equipment. Address: Box 391, FOUNDRY, Cleveland 13, Ohio.

For Sale

TESTING MACHINES

1—Riehle 400,000# hydraulic and beam type Compression Testing Machine
1—Riehle 200,000# Universal
2—Riehle 100,000# Universal
1—T. Olson 100,000#
Also, Simpson Sand Mixers, #0, #1, #1½, #2, #3
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.
OUR 35th YEAR

CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 38, N. Y.
TELEPHONE: BARCLAY 7-0600

FOR SALE

Osborn Model #413-3 Jolt Rollover Pattern Draw Molding Machine—Table size 130" x 42".
#405 Osborn Jolt rollover molding machines. Table size 79".
#403 Osborn Jolt Rollover—42" swinging table.
SPO Model 914 Jolt Rollover Squeeze Molding Machine.
#918 Johnston & Jennings Jolt Rollover and Pattern Draw—Table size 44" x 54".
(2) International RES jolt, squeeze, rollover, and draw molding machines—800 lb. capacity.
Model 2047-3 Osborn Jolt Rollover and Pattern Draw molding machines.
Beardsley & Piper Sandslinger—Model #SS-30. Stationary type—16'-6" swing.
70 ton Structural steel Sand bin with apron feeder.
10' 850 cu. ft. Round steel storage bin with plate feeder.
Beardsley & Piper 16' Turntable with 5 Champion Pu h off machines.
Champion Core Blower—Model CD-8.
2 to 20 ton Electromelt melting furnaces.
Hough Payloader—Model HA.
5000 lb. Automatic Fork Lift Truck, electric, with Edison battery.
6000 lb. Clark Ford Lift Truck, gasoline.

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HTS. 18, OHIO
TELEPHONE: FAIRMONT 1-1186

FOR SALE

Tumbling Barrel
Sly Type B, Round
48" x 72"
15 HP Motor, 2 Doors
Located N.E. Ohio
Priced for Quick Sale

BOX 414
FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—ELECTRIC FURNACE—Detroit type LFY 1000# capacity 175 KVA complete with panel board, rocking motor and transformer.
1—SANDBLAST MACHINE—Pangborn 8' cabinet with elevator, and 15 H.P. 3/60/220 motor.
1—BRAND NEW ROOTS CONNERSVILLE BLOWER—18 x 54 type RCS, Serial H 16694

S. D. HICKS & SON CO.
1671 HYDE PARK AVE. BOSTON 36, MASS.

For Sale

PRICED RIGHT FOR QUICK SALE

BUSCH SPRUE CUTTER, heavy duty for steel, 8" throat, capacity 1¾" square, 2½" round, equipped with 7½ HP, AC motor.

ROLLER CONVEYOR, approximately 500' BP, 10' lengths, 2" diameter rollers, 8" centers, rollers above angles.

INTERNATIONAL CORE BLOWER #SB11, 15" x 24" table.

MILWAUKEE ELECTRIC HOIST 1 ton capacity, 2 motors, motorized trolley, 10' lift.

GLOBE MACHINERY CO.

602 W. LAKE STREET, CHICAGO 6, ILLINOIS
ANdover 3-4185

FOR SALE
SAND BLAST EQUIPMENT

Wheelabrators-Tumblast size 48 x 42
Wheelabrator size 48 x 48. Like new. $6000.00.
Wheelabrator 27 x 36 Tumblast good condition—rubber belt. $3000.00.
Sly-master Blast size 36 x 42. Good condition.
Pangborn ES-207 Blast Cleaning Cabinet used for Strip steel or bar stock. $1750.00.
Pangborn 8 ft. table. Like new. $4000.00.
Sand Blast Cabinets, pressure tanks, dust collectors and blowers. All sizes.
Contact us for your sandblasting needs or any surplus sandblasting parts and equipment you have for sale.
Will accept your small machines as trade in on any of the above equipment.

DIAMOND SALES INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

EQUIPMENT FOR SALE

2—Osborn #601 jolt rollover pattern draw machines.
1—Milwaukee #60-B jolt rollover pattern draw machine.
1—American Wheelabrator tumblast 27 x 36 without skip hoist.
1—American Wheelabrator tumblast 36 x 42 with skip hoist.
1—American AM sandcutter.
1—American A.A. sandcutter gasoline driven.
2—U.S. Johnston & Jennings #2 jolt squeeze pinlift machines.
2—Tabor portable jolt squeeze pin lift machines.
All the above equipment is in good condition and priced to sell.

MARCH BROWNBACK CO., INC.
POTTSTOWN, PA.

FOR SALE

Osborn #413-9 Molding Machine
Serial #11947
Built in 1949
Excellent Working Condition

BALDWIN-LIMA-HAMILTON
HAMILTON, OHIO

FOR SALE

No. 3 American Wheelabrator Tablast, Serial #A46702. Built in 1943. Used about four years. Has four 48" tables, two blast wheels. Complete with motors 440 V., 60 Cycle, 3 Ph. and supply of spare parts. In good operating condition. Write or phone: **E. M. BREITHAUPT, PLANT ENGINEER, COMMERCIAL STEEL CASTING CO., MARION, OHIO, PHONE 2-1131.**

FOR SALE

Spencer multi-stage turbo compressor, catalog #1220, 2300 C.F.M. at 20 ounces per square inch pressure. Complete with Spencer outlet adjusting valve. Motor 20 H.P., 1750 R.P.M. 3 phase, 60 cycle, 220/440 volts. Serial #39470. A-1 condition. Address: Box 433, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

#721 Osborn-Jolt Squeeze Stripper, Serial #81686, 800# capacity 22" X 26" Platen Stationary type requires 11" floor pit. Ideal for under Sand Chute. First class condition. Address: ATLAS FOUNDRY COMPANY, MARION, INDIANA.

FOR SALE

One American Model K, 6' Sand Cutter, 220/440 volt, new blades just installed. Price $600.00. Address: **CADILLAC FOUNDRY CO., INC., BOX 218, CADILLAC, MICHIGAN**

For Sale

FOR SALE

MOLDING MACHINES

8—13 x 8 Tabor power squeeze flask lift machine split pattern type.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
4—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.
1—International G 24 x 10 air jolt and rollover, foot draw, portable.
2—International PKL 14"-5½" Jolt Squeeze Pin Lift.
1—Tabor Pedestal Core Rollover Hand Ram Rollover Draw 14 x 20 table 8" draw.

BLOWERS FOR CUPOLAS AND FURNACES

2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.
2—#7½ Rotary Blowers 27 x 81, 14000 CFM.

METAL MELTING EQUIPMENT

2—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld Stationary Brass, Multiple gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.

MISCELLANEOUS

1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
25 Tons steel flasks in sizes from 26 x 26 to 60 x 60.
1—McLeod Small Sand Blast Barrel 24 x 24.
1—36W Wet Type Roto-Clone 34000 CFM.
1—24W Wet Type Roto-Clone 13000 CFM.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

36 x 42" Wheelabrator. Priced right.
Rollovers; Hermans, Davenports, Osborns, Johnston & Jennings, etc.
Sandslingers—2 Tractor Type—1 Mobile.
Strippers: Davenports, Johnston & Jennings.
Jolt Squeezers: Osborns, SPO, Tabor, Milwaukee.
Speed Muller #60-41, Skip Hoist, etc.
Grinders: 20 HP to 3 HP.
Allis Chalmers 8500 CFM Centrifugal Blower.
2000# Hausfeld Oil Fire Aluminum Furnace.
7—#94 Monarch Melting Furnaces.
2 Ton Electric Crane, 18' span.
4—Johnston & Jennings Jolt Squeezers, Stripping Plate #2, 16" Squeeze Cylinder.
Complete Overhead Sand Handling System with 2—#3 Simpson Mixers.
SEND FOR OUR LATEST LIST #1052.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD STREET
SHILLINGTON, PENNA.
PHONES—READING—30311—40146
R. B. HARRISON, FDRY. MGR.

FOR SALE

1—Internation Type PK Jolt Squeeze Pin Lift, 18" Cylinder, 8" Lift.

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

MACHINERY FOR SALE

2—Johnston & Jennings jolt pin lift. Molding machines, 30" x 36" table, 10" draw. Address: GOLD FOUNDRY & MACHINE WORKS, 1618 SOUTH OSAGE ST., INDEPENDENCE, MO.

FOR SALE

American Sand Cutter, size 69 by 45, Model AM. Address **PIKE MACHINE COMPANY, 23460 LAKELAND, CLEVELAND 23, OHIO. PHONE REdwood 1-1880.**

For Sale

CORE BLOWER FOR SALE

Osborn 92 for medium sized cores. Purchased March 20, 1951. Never used. Price—$1500.00.

BOX 467

FOUNDRY CLEVELAND 13, OHIO

PLATFORM TRUCKS

4—6000 lb Baker Electric Trucks, Platform 32" x 54"—11" to 15" lift
2—as above except 11" to 60" lift
500—Hardwood skids 33" x 48"—11½" under clearance, steel legs, 1⅛" decking. Bargain.

NATIONAL EQUIPMENT SALES, INC.
24-16 JACKSON AVE. L.I. CITY, NEW YORK

FOR SALE

We buy and sell used and new foundry equipment.

HAYNES FOUNDRY EQUIPMENT CO.
KALAMAZOO, MICHIGAN

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP
World headquarters for T.E.F.C. and explosion proof motors.
World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

FOR SALE

6—Tabor Pneumatic Molding Machines, 10 inch squeeze.. Price—$135 each
4—Farwell Portable Squeezing Machines ..... Price—$ 75 each
Royer Sand Blenders .... Price—$175 each
Sanditioner Jeffrey No. 1, Capacity 10-15 tons of sand per hour ..... Price—$450
No. 2—American Wheelabrator Table with 8-24" Multi-tables ..... Price—$2750
Pangborn Sand Blasting Cabinet, Type EN2 ..... Price—$250
Ruemelin Cabinet with Turntable ..... Price—$275
Sand Blasting Room, walk in, gravity feed with 2000 lbs. generator ..... Price—$450

M. ELSTEIN
141 MANGIN STREET NEW YORK 2, N. Y.

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6750	24 oz.	Spencer	800	8 oz.	No. Am.
4500	16 oz.	G.E.	675	16 oz.	Spencer
4000	32 oz.	Spencer	660	20 oz.	A-B
3500	40 oz.	Spencer	500	10 oz.	No. Am.
2800	1 oz.	Spencer	400	4.3 oz.	Spencer
2700	16 oz.	No. Am.	340	20 oz.	A-B
2700	16 oz.	Spencer	320	12 oz.	Spencer
2500	7 oz.	Sturt.	225	16 oz.	Spencer
2200	16 oz.	No. Am.	180	15 oz.	Spencer
2000	2½ oz.	Spencer	9100	7" SP	Sturt.
2000	1 oz.	Spencer	1100	4½" SP	Bayley
1150	20 oz.	No. Am.	100	7" SP	Spencer

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

PATTERN LUMBER
FOR SALE

Several thousand feet of Honduras Mahogany and approximately one carload of Spanish Cedar. All Kiln-Dried and selected for patterns.
GRADES: FAS, SELECT, NO. 1 COMMON AND PIN HOLE WORMY
WILL SELL ANY AMOUNT—SOME SHORTS ARE AVAILABLE

UNITED WOODWORKING INDUSTRY
800 NORTH 37TH PLACE BIRMINGHAM 4, ALA.

FOR SALE

One Mommert Dixon Swing Grinder with 10 H.P. motor in good condition—$800.00 Price includes three 24" x 2½" x 12" grinding wheels, two for cast iron and one for steel. Address: **WERNER FOUNDRY & MACHINE CO., LANSDALE, PENNSYLVANIA.**

CLASSIFIED ADVERTISING

FOR SALE

Simplicity Shakeouts 3' x 5', new in 1948 $700.00
Simplicity Shakeouts 3' x 3', new in 1948 $600.00
Automatic Transporter, 4000 lbs. Electric $425.00
Automatic Platform Lift Truck, Lifts 5', 3000 lbs. Electric, 1946, Excellent shape $650.00
Lewis-Sheppard Jack Lift Trucks, 4000 lbs. capacity, Hydraulic, New in 1950 .... $125.00
Towmotor Fork Lift Truck, 5000 lbs 9' Lift $1550.00
Clark Fork Lift Truck, 6000 lbs. A-1 ..$1650.00
Brownie Fork Lift Truck 3000 lbs. Lifts 9' $1050
Howe Platform Scale, 4000 lbs, 4' x 5' Elec. $300.00
Fairbanks-Morse Platform Scale, 3' x 4' 6000# $400.00
Beardsly Piper Turn-Table 16' Diameter $750.00
Champion Pin-Lifts, Size 42-6, Good Shape $400.00
Bradley Hammer, with 10 H.P. Motor, 1945 ..... $600.00
Tilting Furnaces, 800 lbs capacity-Alumn $550.00
Redford Bench Core Blower, A-1 Condition $125.00
Spencer 5400 C.F.M. 16 oz. 40 H.P. A-1 $450.00
Spencer 7350 C.F.M. 16 oz. 40 H.P. A-1 $450.00
Roll 200' 18", 7 ply, 35 oz duck ⅛" x 1/16" rubber covered, NEW: Per Foot price ..... $ 3.00
Roll 400' 30", 6 Ply, Hot Sand Belt, ⅛" x 1/32" rubber covered, NEW, Price per Ft. .....$ 4.00
G. E. M. G. Battery Charger New; For Edisons or Lead: Cost $1400.00, ... $450.00
Ingersoll-Rand Air Hoists, 4000 lbs, Like New, equipped with power trolley $375.00
Yale & Towne Spur Gear Chain Hoists—2, 3, 4, 5, Ton.
LARGE ASSORTMENT OF HINES ALUMINUM POP-OFF FLASKS AND JACKETS. STEEL FLASKS; VARIOUS ALUMINUM & TRANSITE CORE PLATES. EQUIPMENT LISTS AVAILABLE ON REQUEST.

A.A.A. SALVAGE COMPANY
856 EDDY ROAD CLEVELAND 8, OHIO

FOR SALE

2-TON HERROULT TILTING TYPE ELECTRIC STEEL FURNACE, side charge, inside dia. of shell 7'3", Transformer cap. 1000 to 1500 KVA at charge of 5000 to 6000#. Complete with 1500 KVA Transformer, 11000/2250 volts, 339 KVA Reactor, (3) Allis-Chalmers D. C. Generators with 7½ HP A.C. motor 3/60-220/440, with extra head, carbon stick electrodes and heads. Serial #147, Electrode Control System installed new in 1947.

INDUSTRIAL PLANTS CORPORATION
90 W. BROADWAY NEW YORK
BArclay 7-4185

FOR SALE

One battery of two recirculating Coleman rack type core oven, 15 ft. 6 in. long, 5 ft. wide and 7 ft. high with side attached oven having shelves 30 inches wide, 15 inches high, equipped with North American dual gas and oil burners complete with Leeds & Northrup recording type controllers. Subject to prior sale. Address: Box 442, FOUNDRY, Cleveland 13, Ohio.

FURNACES FOR SALE

Ten used heat treating furnaces and two seven ton gantry cranes. Good condition and available for immediate delivery. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO

FOR SALE

Clearfield #920 Mixer, excellent condition, Serial 205-C. Complete with motor and starter. Address: **WM. P. LAYTHAM & SONS FOUNDRY, 925 MARKET STREET, PATERSON, NEW JERSEY.**

COMPLETE FOUNDRY

TO BE DISMANTLED

(CAN BE SEEN IN OPERATION)

TO BE SOLD PIECEMEAL — PRICED RIGHT

Most Machines 1947 Mfg.

SAND HANDLING EQUIPMENT

Sand Conveyor, 22" Belt, 115' c to c, with Aerator
Unit A Syntron Feeder Hopper, 6' x 6'
24" Magnetic Belt, 56' c to c
Feeder Sand Belt, 20" wide 14'6"
Rotary Screen Tumbler Barrel, 5' dia. x 12' lg.
2 Aerator, Overshot type, 9' x 2' & 4' x3'
2—36" Apron Feeder, 12'6" c to c
#3 Simpson Mixer, Style E, 8' dia. crib, #49356—1947
#3 Simpson Mixer, Style E, #33147—1945
Belt Conveyor under Sand Mill, 24" wide 25' c to c
Elevator #2, 8" x 16" Buckets 40' c to c
Aetna Sperser System
Bartlett & Snow Waste Sand Handling System
24" Apron Conveyor, Steel, Pan, 53' c to c
Simplicity Shaker, model C
Steel Hopper System, complete with structural supports and Belt, 115' c to c, overhead, hopper sizes
1—6' x 4' x 3'6"
1—12' x 7' x 3'6"
5—4'6" x 4'6" x 1'
Exhaust System
Piping
100 hp Motor
American Blower
Sludge Tank
Oil Froth Wet Dust Collector

MOLDING EQUIPMENT

Herman Jolt Roll Over # 6000, 40" x 60", 1947
2—Herman Jolt Stripper, 48" x 54", 1947
2—Herman Jolt Stripper, 48" x 54", 1947
Osborn Jolt Roll Over, model 405, with Roll Out Car
Osborn Jolt Roll Over, model 405S, with Roll Out Car 44" x 48"
Champion Stripper, 36" x 48" x 8", 1947
2—Int'l Portable Jolt Squeezer Power Pin Lift, PKL 12, 1947
3—Int'l Portable Jolt Squeez Pin Lift, PKL 14, 1947
2—Osborn Portable Stripper, 712J, Pin Lift
2—Int'l Roll Over, model G, 30 x 8, 1948

MOLD HANDLING & SHAKEOUT EQUIPMENT

Stoney Double Jolt Knock Out
Simplicity 4 x 7 Shakeout, model B
Productive Shakeout 6 x 8
500 ft. Cleveland Tramrail
900 ft. 10" Logan Roller Conveyor 3½" dia.
Jeffrey Powered Wood Slat Conveyor

CRANES & HOISTS

Budgit Top Running Bridge Crane #46, 15' span
15—Curtis Traveling Bridge, 15' span
4—I-R size D 4000# Air Hoist
16—Curtis Air Hoist, 5 x 6" Cylinders, 3½' x 4' Lifts
3—Keller 300# cap. Air Hoist, size 86-IV3

CUPOLA & LADLE EQUIPMENT

Cupola, 54" I.D. by 39'
Roots Connersville Blower, 22 x 66, 75 hp
Roots Connersville Blower, 12 x 30, 20 hp
Blystone Mixer
5—Modern Cylindrical 2000# cap. Ladles, Hand Gear Trolley Type
Modern Tub Ladle, Trolley Type, 2000# cap.
Modern Tub Ladle, Trolley Type, 300# cap.
Modern Mixing Ladle, 36" x 54", Hand Gear, 3 ton cap.

CORE DEPARTMENT

3—Young Bros. Core Drying Oven 12' x 12' x 8'

MISC. FOUNDRY EQPT.

B & P Screenarator
Dayton Pneumatic Floor Ram
5—Master Size 2F Floor Rammers
American Sand Cutter, Model AA

SAND TESTING EQUIPMENT

Compression Test Machine
Specimen Rammer
Permeability Tester
Moisture Drying Machine

IN ADDITION

3000 ft. Webb Overhead Trolley Conveyor #458
Baker Lift Truck, 6000# cap., 1948
Pangborn Rotoblast, 14' cap. with 5 five ft. tables
Logan Wood Slat Conveyor, motorized. 36" x 35' Roller Conveyor
Thor Tool Balancers
Hand Grinders
Diamond Co. Heavy Duty Horizontal Grinder, 30" wheel
Hammond Double End Snag Grinder
7—18" Pedestal Grinders
Tons of Flasks
Core Blower, Champion, model CB 400, 300 lb Cores, 1943
Gogan Brinell Testing Machine, Stationary, Floor Type model 2133, table 27½" x 24" x 7" high
Spencer Turbo Blowers, 2250 cfm at 16 oz—2850 at 16 oz
Roto-Clone units, 24W & 36W, with sludge ejectors
Vibrators, Osborn, 1⅝" & 2"
Welded Steel Pouring Crucibles, new. 1700#
Bottom Dump, Sand Buggies
Exhaust Fans—to 60"
Motors—TEFC & TEFCXP
Fire Extinguishers—CO2
Exhaust Blowers—all sizes

ALLIED MATERIALS HANDLING COMPANY

4657 Spring Grove **Cincinnati 32, Ohio**

PHONE: MU 5465

For Sale

FOUNDRY EQUIPMENT

MULLERS

Simpson #3 Model H Style B Intensive Mixer cooling system and rotary screen in excellent condition

2—Clearfield #2 Mullers C10 Serial 169A-169B Timken bearings with motors and controls. FOB Erie, Pa.

1—B & P Speed Muller, Size 40

SHAKEOUT

3' x 5' Link-Belt Shakeout 3/60/220 motor. Excellent condition. Present location Erie, Pa.

1—4' x 6' Simplicity Shakeout 3/60/220-440 5 HP G.E. Tri-Clad motor

WHEELABRATOR

1—36 x 42" American Wheelabrator Series 370 Tumblast. Used very little 15 HP main motor 3/60/330/440 V.

MOLDING MACHINES

1—Hermann Rollover Pattern Draw 20 x 30" with bumper 6" cylinder. New 1942. FOB Erie, Pa.

1—Hermann High Speed Jolt Rollover, 4000#, 36 x 60" with 32 x 48" bumper, 13" cylinder, with pattern device. New 1940. FOB Erie, Pa.

1—Tabor 1000# Rollover Molding Machine 30 x 51". New 1944. FOB Erie, Pa.

2—Beardsley & Piper Champion Pin Lift pushoffs 44" x 44"—12" draw. New 1948

2—Beardsley & Piper Champion Pin Lift pushoffs. 32X36", 8" draw

1—Osborn Portable Jolt Rollover Pattern Draw model 601-13, 30" x 24" flask size, 10" draw, 900# cap. FOB Ordill, Ill.

1—International 13" PJS. Jolt Squeeze Molding Machine. Stationary 18x26" table.

3—Champion molding machines JSL-12P

AIR TROLLEYS

2—Ingersoll Rand 2000-6000# capacity motor driven Trolleys

BLOWERS AND FANS

Spencer Turbo Blower, 4500 CFM @ 32 oz. Serial 44788—22/440 V., 60 HP, G.E, triclad induction motor. New Dec., 1946.

CRANES

5 Ton P & H Overhead traveling crane, double girder cab operated 30'—6" span 15' lift, 3 motors 3/60/220 V., A.C., Serial 12946B. New 1946.

10 Ton Northern Bridge Crane, box frame double girder, fish belly, 230 V., D.C. 54' 7½" wide C to C of bridge wheels, cab operated 3 motors

YARD CRANES

Hughes Keenan MC-4 15,000# capacity Truck Crane, solid tires, all weather steel cab and heater. Telescopic boom 12'—18' gasoline engine. Excellent condition

Krane Kar, 10,000# Model AX, telescopic boom 12'—18' solid tires, gasoline engine. Rebuilt, guaranteed

GRINDERS

Fox Swing Frame Grinder, with 10 HP G.E. Induction motor 220/440 volt, 60 cycle, 3 phase

AIR HOISTS

2000# Chicago Pneumatic Air Hoist, "Little Giant" Model A. Serial CP330648

4000# Chicago Pneumatic Air Hoist "Little Giant". Serial CP 284433

MELTING EQUIPMENT

5—New Stroman 1000# aluminum Melting Furnaces, Type SD-1. Oil fired manual tilt type completely lined, in original crates, with 3 HP Stroman Blowers.

ACME EQUIPMENT CO., INC.

126 S. CLINTON ST. CHICAGO 6, ILL.

PHONE: ANdover 3-3430

JUST PURCHASED

EQUIPMENT OF ESTATE STOVE CO.

HAMILTON, OHIO

To be sold from the premises.

2—Complete sand conditioning systems including shakeouts, conveyors, elevators, aprons, molders, hoppers and all structural supports.—May be purchased complete or in part.

18—#275 J Osborn Jolt Squeeze Molding Machines . . . . . ea. $290

3—#601 Osborn Jolt Rollovers . . . . . ea. $550

1—#403 Osborn Jolt Rollover . . . . . ea. $1150

2—#559 Osborn Jolt Strippers . . . . . ea. $850

4—30"x60" Tumbling Mills single gear head drive . . . . . comp. $1400

1—16"x100' Flat Slat Conveyor $1500

1—36"x95' Steel Apron Conveyor $2950

3—Whiting #5 Cupolas complete with blowers

1—Osborn #192 Core Blower $675

12—2000# Shepherd Hoists D.C. 220 V

1—Lot approx. 200' Roller Conveyor 27" rolls, 4" centers Hevi-Duty

1—Lot Electrified Monorail, approx. 600' long with switches & turns

1—Pangborn 14'-0 Rotoblast table complete with dust collector 2 Heads $7500

1—36"x48" Pangborn air blast barrel $1250

Approx. 100 Tons steel flasks assorted sizes—Ex. Cond. 8c lb.

200—Cherry snap flasks assorted sizes

ADDITIONAL EQUIPMENT AT READING WAREHOUSE

1—#3 American Wheelabrator Tablast 48" Auxiliary Tables—Perfect Condition $6500

1—Pangborn 21 cu ft Rotoblast barrel with skip loader $7750

2—#610 Clearfield Mullers 20 HP Motors . . . . . ea. $2250

1—Coleman Core Oven drawer type 4 drawers high—2 drawers wide. Oil fired—complete controls —Rebuilt & Guaranteed $2250

6—#30T 30 x 30 Davenport Jolt Strippers . . . . . ea. $650

1—#400 Champion Core Blower—Like New

COMPETE LISTS AVAILABLE ON REQUEST

"We purchase or liquidate complete plants.

Get the most money for your surplus equipment."

LAND-WHITEHEAD EQUIPMENT CORP.

P. O. BOX 756 READING, PA.

PHONE 5-4379

FOR SALE

Molding Machines

3—#2166 SPO Jolt Squeeze Pin Lift
4—#814-P Osborn Jolt Squeeze Pin Lift
1—6000# Herman Rollover and Pattern Draw, Rollover 42″ x 90″ Jarring table 40″ x 84″, 9400# cap.
1—#405 Osborn Rollover and Pattern Draw, 18″ draw 3000# jolt cap. flask size 64″ x 50″, ser. #10812
5—#601-13 Osborn Jolt Rollover & Pattern Draw
4—#2047-4 Osborn Jolt Rollover & Pattern Draw for cylinder head core production
1—30″ x 40″ Tabor Rollover & Pattern Draw, Jolt cap. 1000#, draw 12″
1—SA-34 Davenport Jolt Rollover & Pattern Draw, 2500# cap. 15″ draw 34″ x 48″ table, flask 36″ x 64″
2—SA-24 Davenport Jolt Rollover & Pattern Draw, 1000# cap. 12″ draw 24″ x 38″ table, flask 26″ x 42″
1—34-A-JS Davenport Jolt Pin Lift, 2500# cap. 12″ draw, 36″ x 46″ table
5—Champion Draw Power Pushoff Machine 10″ draw, 38″ x 40″ table
4—International Type JFL Jolt Ram, Foot Lever Pin Lift

Core Room Equipment

1—#1 Demmler Core Blower
1—#3E Demmler Core Blower.
6—#92 Osborn Core Blower
1—20″ Paddle type sand mixer
2—#2 Simpson Mullers, 1—#3 Simpson Muller
2—#70 Beardsley-Piper Mullers
1—Revolving Core Conveyor table
2—60′ Tower Core Ovens
1—Link-Belt core breaker drum
1—Kane & Roach Wire Straightener 3/16″ to ½″ wire. 7½ HP. 440V.3/60
Various sizes transite core plates

Cleaning & Grinding

1—48″ x 42″ American Wheelabrator
2—Fin Cleaning Machines for cleaning cylinder heads.
1—3 H.P. double stand grinder—flat belt drive 220/440/3/60
1—10 H.P. double stand grinder—direct connected 220/440/3/60

Misc. Foundry Equipment

1—4′ x 10′ Robbins Shake-out with 7½ H.P. motor 220/440/3/60
1—4′ x 6′ Simplicity Shake-out, Model D, 16000# cap.
1—10 ton Heroult electric furnace
1—500# Monarch hand tilt furnace
3—Beardsley-Piper Stationary Sand slingers
2—#3 Jeffrey Vibrators for shakeout
4—#4 Jeffrey Vibrators for shakeout
2—50 H.P. Spencer Turbine Cupola Blowers 16 oz. 220/440/3/60
1—20 H.P. North American Turbine Blower 24 oz. 220/440/3/60
2—3 H.P. Blowers for furnaces 16 oz. 220/440/3/60
1—Pig Mold Conveyor (Link-Belt) 74′ lg. complete with drive for Aluminum and magnesium
2—1000 Gals. p. Min. Centrifugal Pumps, Ingersoll-Rand, 52 ft. head, 5″ suction, 4″ discharge, dir. connected 20 H.P. 220/440/3/60. Rebuilt, like new
Various sizes steel flasks, Hines Popoff flasks and jackets

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

15019 Saranac Rd., Cleveland 10, Ohio — Telephone—GLenville 1-1538

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words or less, $3.00. Additional words 10c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $6.00. Additional words 20c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

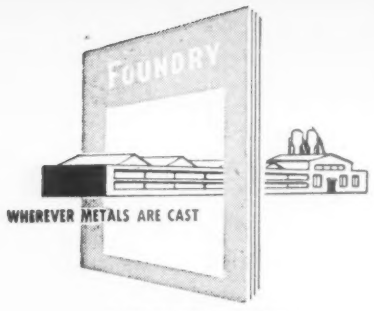
Single Column 2¼″ Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 18.00	$ 16.50	$ 15.00	$ 13.50
2 inches	32.50	30.00	27.50	25.00
3 inches	46.50	43.00	39.50	36.00
4 inches	60.00	55.50	51.00	46.50
5 inches	73.00	67.50	62.00	56.50
6 inches	85.50	79.00	72.50	66.00
7 inches	97.50	90.00	82.50	75.00
8 inches	109.00	100.50	92.00	83.50
9 inches	120.00	110.50	101.00	91.50
10 inches (1 col.)	130.50	120.00	109.50	99.00
Half page	195.00	180.00	165.00	150.00
Full page	330.00	300.00	270.00	240.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO



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Dear Reader:

Antioch College: We had the pleasure recently of talking with Mr. Rollin Brewer, Associate Personnel Director, Antioch College, Yellow Springs, Ohio about our own need for young men planning careers in sales and advertising. Mr. Brewer paid tribute to the work the Foundry Educational Foundation is doing in selling careers in the foundry industry. He reports that FEF's program is one of the best. If you aren't aware of the FEF program and would like to participate, write to Executive Director George Dreher, Terminal Tower, Cleveland.

—o—

Foundry Industry Census: We are currently conducting our every-other-year census of the foundry industry and invite you to return your questionnaire to FOUNDRY if you haven't already done so. Completely new and up-to-date information on the size and scope of the foundry industry will be compiled and published in an early summer issue of FOUNDRY.

—o—

More Pig Iron: Another new blast furnace is scheduled for construction in Cleveland by U. S. Steel's American Steel & Wire Division. According to a recent announcement, it will have a daily capacity of 1,350 tons of pig iron. Within the past year, Jones & Laughlin and Republic have each put a new blast furnace into operation here—foundries will be principal beneficiaries. So the dynamic foundry industry continues its robust growth.

—o—

1952 Foundry Production: Final figures on 1952 production of castings will not be available until March or April. In the meantime, Associate Editor Bob Herrmann has studied reports for the first nine months of 1952 and has estimated the following totals for the year (all figures are net tons production for sale and own use): Gray Iron 12,600,000, Malleable 925,000, Steel 2,000,000, Nonferrous 978,000. Estimated total castings production: 16,503,000 net tons.

—o—

Coming in 1953: FOUNDRY will have three special issues in the year ahead. In each case, they will be our regular issues with added editorial content devoted to the special subjects indicated, namely: Ford issue (March); Pre-Convention issue (May); Post-Convention issue (June).

(Next page, please)

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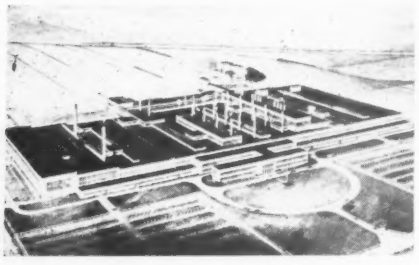
Cleveland Ford Foundry: You will have a good look at this new production foundry in our forthcoming March issue. The Editors of FOUNDRY have been inspecting all parts of this new plant and will bring you a

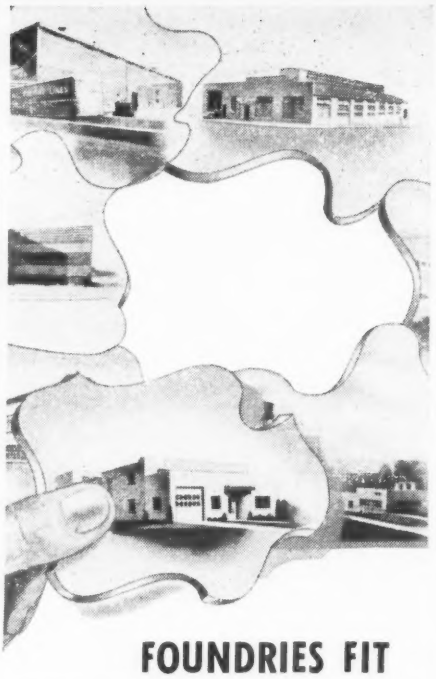


detailed story of the Cleveland Ford Foundry, complete in the March issue. Although not the largest production foundry in the country, the new Ford foundry is probably one of the most modern of the larger plants. For the benefit of suppliers wishing to obtain photographs of installations in the Ford plant, we have prepared a special bulletin which we'll be glad to send on request.

—o—

Shell molding: We still have a few reprints of the 10-page editorial feature, "The Shell Molding Process, Its Mechanics and Applications." Write to Jeanne Franklin, FOUNDRY Business Staff, and a copy will be sent to you. Did you read the shell molding story written by Garnet Phillips, International Harvester, as it appeared in our November and December issues? Much literature on the subject is now available. The following companies currently describe their shell molding equipment, accessories and resins in FOUNDRY and will supply you with literature at your request: *Equipment* and *accessories:* Patterson-Kelley Co., 1420 Lackawanna Ave., East Stroudsburg, N. Y.; Shellmold & Machine Co., 65 Pine Street, New York 5; Sutter Products Co., Dearborn, Mich.; Winter Engineering Co., 1200 Niagara, Buffalo 13; World Bestos, New Castle, Ind.; *Resins:* Bakelite Corp., 300 Madison Ave., New York 17; Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.; General Electric Co., Pittsfield, Mass.; Hercules Powder Co., Wilmington, Del.; Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.; Reichhold Chemicals, Inc., 630 Fifth Ave., New York 20.

Business Manager



FOUNDRIES FIT INTO NO OTHER MARKET

THINGS ARE HAPPENING IN THE FOUNDRY INDUSTRY

Foundrymen speak a "language of their own" and those who sell successfully to foundries learned a long time ago to recognize them as an individual market—bound together by common practices and common problems found in no other industry.

An independent sales effort directed to foundries will pay dividends . . . this mass production industry is spending *over one million dollars every hour for materials and supplies—and two million dollars every week in capital investments.*

To meet the demand for castings, America's foundries last year topped every previous production record, including peak war years!

To make sure your story gets across to foundrymen, tell it in FOUNDRY. With its 45,000 readers, FOUNDRY gives you blanket coverage of the foundries that have 94% of the industry's melting capacity.

DO YOU HAVE THESE MARKETING AIDS?

- Marketing Guide, "How To Sell the Foundry Market." Available free.
- Data File, "Sizing up the Foundry Market." Available free.
- Penton's Foundry Directory. Cost $75.00.

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TYPE C
STEEL SLOTTED VENT — Thin head, chrome plated, use in flat surfaces of core boxes. Slot widths .010", .013" and .015".

DEMMLER

PRECISION CORE BOX VENTS

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SCREEN VENT — Brass body with stainless steel wire mesh. Standard meshes No. 30, No. 40 and No. 50 available.

TYPE L
LECTROMESH VENT — Brass vent, head made of .010" thick Lectromesh sheet, with .022" square holes.

TYPE A
PERPORATED VENTS — Head of brass perforated sheet, .016" thick. Hole sizes: No. 00 (.020" dia.), No. 0 (.024" dia.) No. 1 (.027" dia.), No. 2 (.033" dia.)

TYPE B
PERFORATED VENTS — Staggered slots, .020" x .115", brass vent with head of brass perforated sheet.

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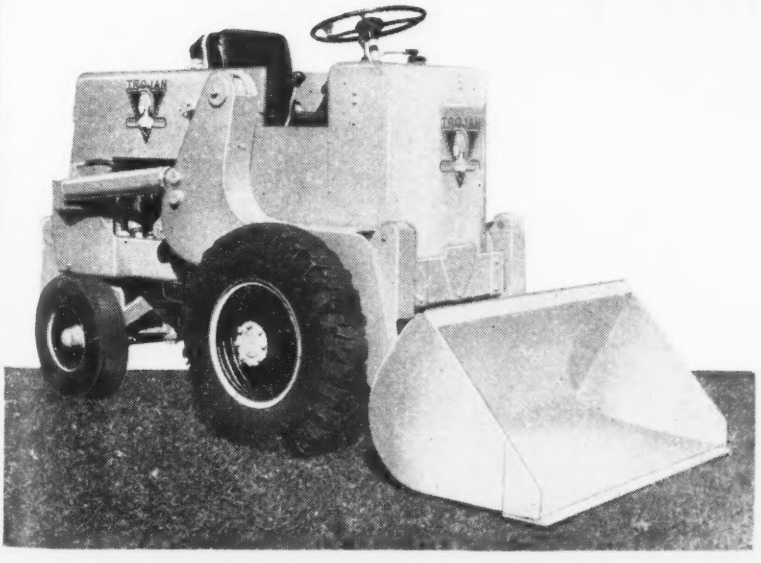

The Loadster is being talked about —and praised too—for its ability to load fast, travel fast, and dump fast. With Trojan's advanced design owners are assured of more tonnage per day. Here's why: bucket action independent of hoist . . . low load carrying position . . . reverse curve bucket arms . . . 12 cu. ft. bucket . . . 31 H. P. engine. For more information about the Trojan Loadster LA-40, write to Dept. F-2.

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BATAVIA, NEW YORK, U.S.A.

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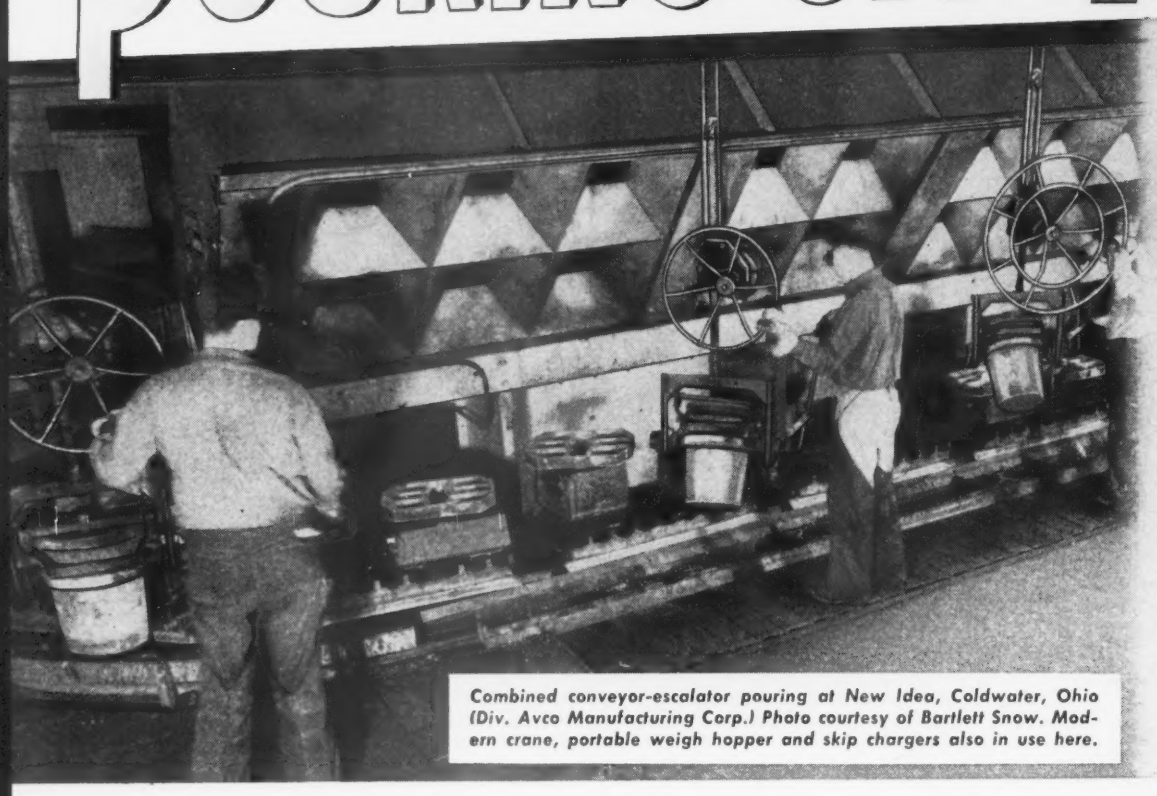
POURING-OFF



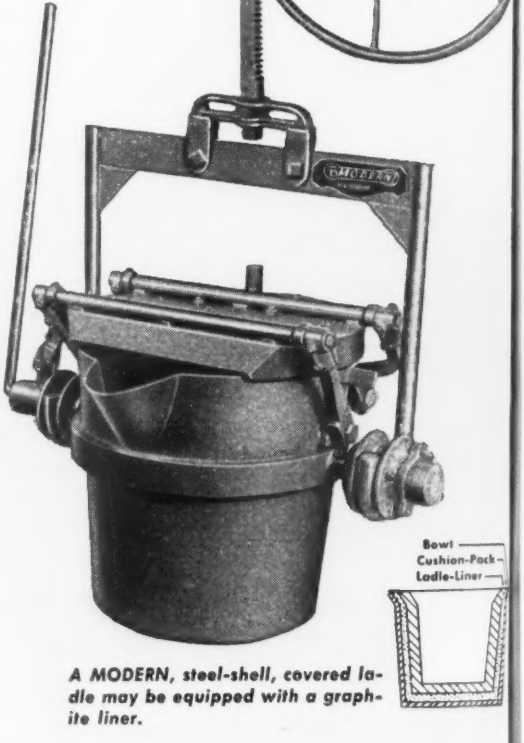
Combined conveyor-escalator pouring at New Idea, Coldwater, Ohio (Div. Avco Manufacturing Corp.) Photo courtesy of Bartlett Snow. Modern crane, portable weigh hopper and skip chargers also in use here.

Rigid, straight-line control from monorail ladle spout insures quick accurate spotting over sprue holes.

Faster • • • Safely • • • Profitably • • •

Much mechanical handling of hot metal does flow through basic, routine channels between cupola spouts and sprue holes. BUT, every pouring floor presents problems that are DIFFERENT! These DIFFERENCES may arise from variations in cupola-spout and monorail heights. DIFFERING, too, are heights of molds and pouring platforms. Speed ratios, between conveyor and escalator in the pouring system shown here, require the closest timing.

Prescribing for and designing to meet all these and related DIFFERENCES is specialized business which should be entrusted only with foundry equipment specialists. KNOWING HOW to engineer the over-all system into a smooth RECEIVING . . . DISTRIBUTING and POURING line is a result of MODERN'S thirty-five year's experience. It's a tested, profit-boosting service that's FREE to foundry executives who outline their problems on their own company letterheads. For information only you can use the coupon . . .



A MODERN, steel-shell, covered ladle may be equipped with a graphite liner.

MODERN

MODERN EQUIPMENT COMPANY
Dept. F-152, Port Washington, Wisconsin

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Catalog #147 — metal pouring systems, ladles, linings, etc. ☐
Catalog #149 — shanks, pouring ladles, distributors, reservoir ladles, ladle trucks, etc. ☐
Catalog #147-A — cupolas, chargers, hot blast, air control, spark arrestors, etc. ☐

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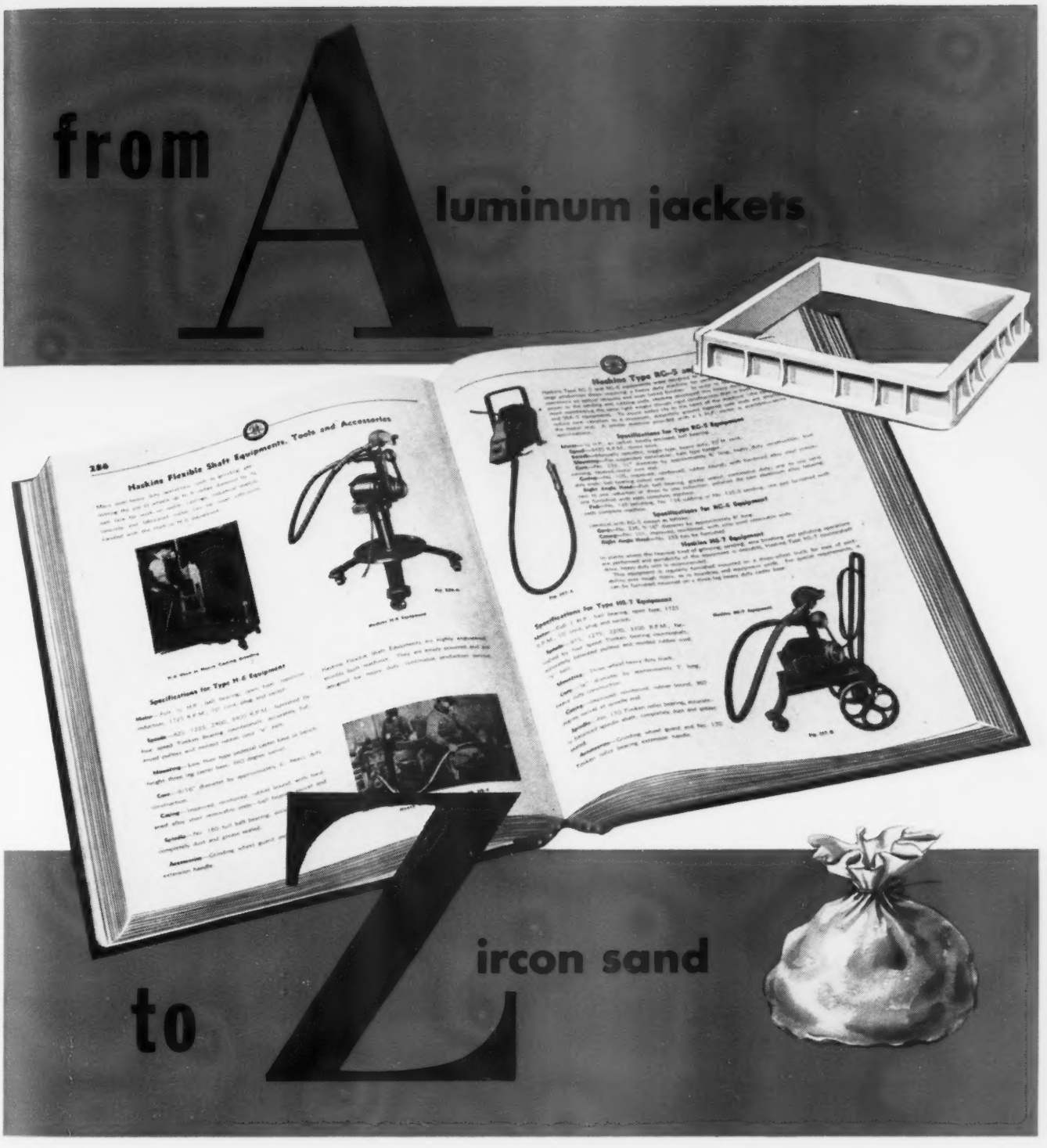
MODERN REPRESENTATIVES IN ALL PARTS OF THE WORLD



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STEVENS
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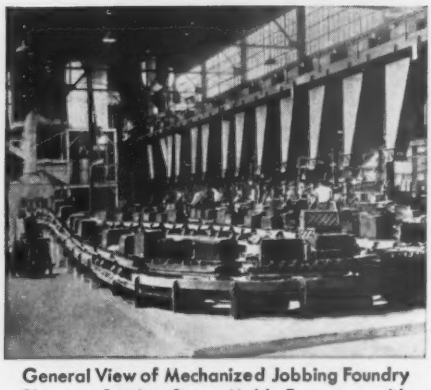
EVERYTHING FOR A FOUNDRY

Remember your *Mold Conveyor*

is the only piece of equipment that handles *All* the core sand, *All* the molding sand, *All* the metal and *All* the flasks in your foundry. It should be of rugged, durable construction.



General View of Mechanized Jobbing Foundry Showing Bartlett-Snow Mold Conveyor with Elevated Shakeout and Self-Dumping Cars.

Bartlett-Snow Intermittently Operated Car Type Mold Conveyor Handling Large Molds in Gray Iron Jobbing Foundry.

● Built with heavy, ribbed, overlapping cast iron car tops — large diameter straight faced anti-friction wheels — through shafts connected to heavy duty roller chain that is center guided around the entire loop—and smoothly driven through a variable speed caterpillar drive, Bartlett-Snow floor type mold conveyors are unsurpassed for long, dependable operation. Horizontal or up-and-down designs available — single or double axle type.

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ENGINEERS

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CLEVELAND 5, OHIO

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ERECTORS

Foundrymen Who Know — Buy Bartlett-Snow